FRM220-CH20
(In-Band Managed Multi-Service Platform)
FRM220A-CH20
(Ethernet Aggregation Platform)

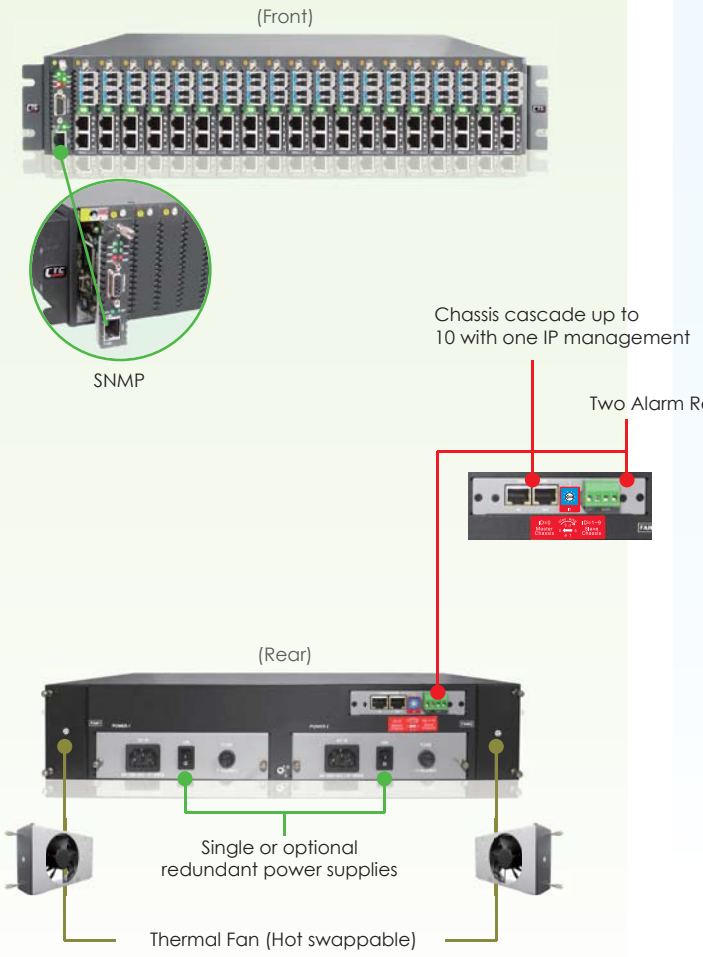
The FRM220-CH20 and FRM220A-CH20 are 2U high 19" Rack, 20 Slot modular media converter chassis with redundant power and all hot swappable design. They provide an economic solution in high density fiber converter installations in enterprises or central offices. Particularly, FRM220A chassis supports an uplink Gigabyte Ethernet switch, for efficient scalability and easy deployment in access networks. All critical components, Power, fans, management module and interface cards are hot swappable, allowing online field replacement. The chassis also has a pair of alarm relays and are able to stack up to 10 chassis using only one management IP address. A number of cards are available that support different protocols including Ethernet, Voice, Data, transponders, FOM and IMUX.

Features

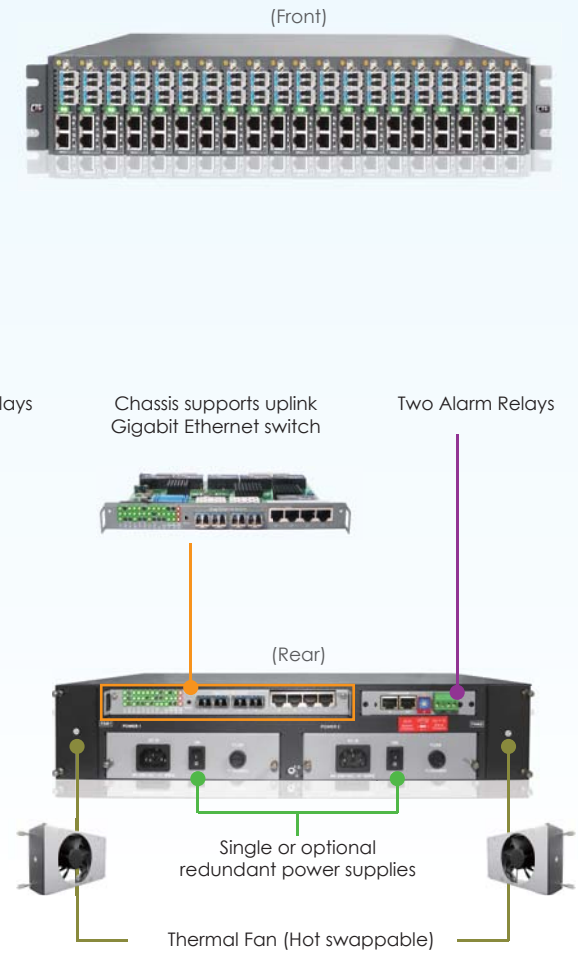
- 2U 19" 20-slot Chassis with AC/DC power redundancy
- Chassis cascade up to 10 with one IP management (FRM220-CH20 only)
- Chassis backplane consists of passive components
- All modules and cards support hot-swapping
- Two alarm relays
- E1 Inverse Multiplexers are supported by Gigabit Switch
- Chassis supports uplink Gigabit Ethernet switch 4-port 10/100/1000T plus 4-port 1000SX/LX SFP trunk card (FRM220A-CH20 only)

Chassis Overview

FRM220-CH20



FRM220A-CH20



Specifications

Connectors :

- Console RS232(DB9)
- LAN 10/100 Base TX RJ45

Physical Specifications :

- Dimensions(W x D x H): 303mm x 438mm x 88mm
- Weight: 5.2kg w/o P/S

Power Characteristics :

- AC : 100 ~ 240VAC
- DC24 : 18 ~ 36VDC, DC48: 36 ~ 75VDC

Environmental Specifications :

- Operating 0°C ~ 60°C
- Storage -10°C ~ 70°C
- Relative humidity 5% ~ 90% non-condensing
- Predicted MTBF : 65,000 hrs

Certification :

- FCC class A, VCCI class A, CE, RoHS

Power Redundancy

Both chassis power supplies are hot swappable and modular. Installing two into a chassis provides redundancy should a single power supply fail. A fully loaded chassis can run continuously with only one power module fitted into the chassis

Cooling Fan

To further increase system reliability, the FRM220-CH20 and FRM220A-CH20 chassis are fitted with two hot swappable fan modules. Both fan modules can be easily removed from the rear of the chassis, without interruption to the operation of the line cards. A fully loaded chassis can run continuously with only one fan module fitted into the chassis.

Chassis Cascade *(FRM220-CH20 only) Figure 1*

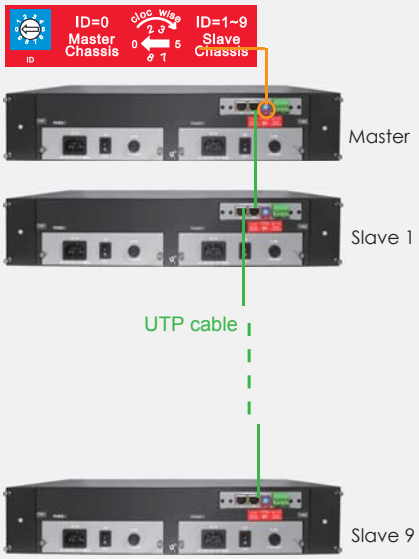
The FRM220-CH20 Chassis features cascadeable management which allows managing a stack (up to 10 chassis) from a single IP address. Chassis are interconnected with standard UTP cables that carry control signals. Each chassis has its own ID, starting with the master chassis ID0 and cascading up to ID9. Network management card (NMC) are still required in each chassis.

Protocol Support

The FRM220-CH20 or FRM220A-CH20 has been designed as a Multi-service platforms. This allows network administrators to deploy the chassis in a wide range of networks. Technologies supported by the chassis included Fast/Gigabit Ethernet, E1/T1, V35/X21/RS530, Serial RS485/422, Voice FXO/FXS, Repeater, Fiber Multiplexer, E1 Inverse Multiplexer (FRM220A-CH20 : Supports a Gigabit Ethernet trunk card)

(Figure 1)

FRM220-CH20 Chassis cascade



10 chassis cascade with one IP management

Network Management *(FRM220-CH20 only)*

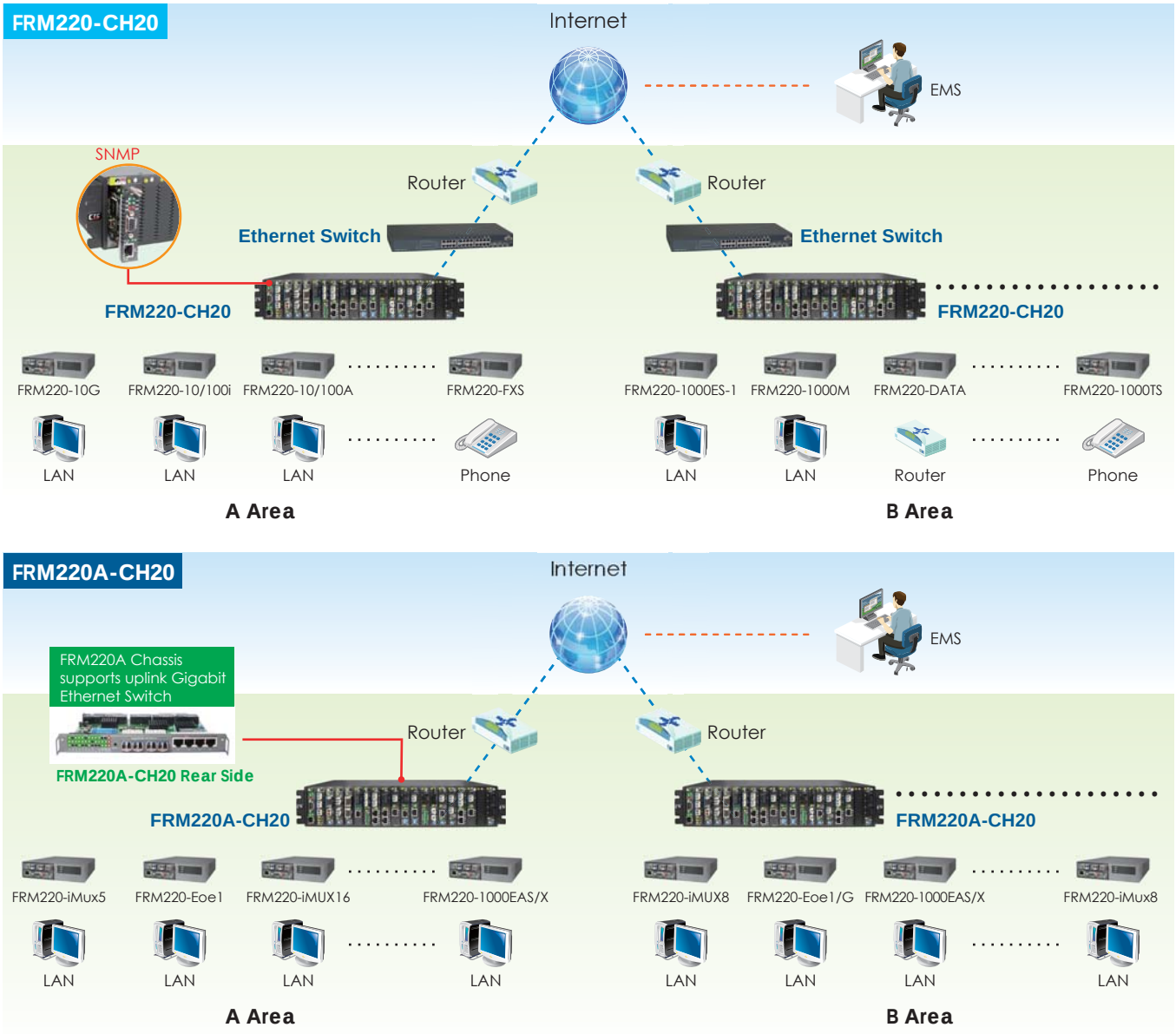
The FRM220-CH20 chassis requires an NMC (Network Management Controller) card which must be installed into the first slot of chassis. The NMC card allows a network administrator the ability to configure and monitor the status of the blades. Management can be achieved locally over RS232, or over the network by Telnet, Web or SNMP If the blades support Ethernet in the First Mile (IEEE 802.3ah), then the management module can also configure and monitor the status of a remote CPE.

Gigabit Ethernet switch with Network Management *(FRM220A-CH20 only)*

The FRM220A-CH20 incorporates a 24+4 Gigabit Ethernet Switch. Twenty ports supply each slot of the 2U 20-slot chassis with an electrical gigabit Ethernet uplink with the remaining four electrical gigabit ports accessible via the rear of the chassis. The additional four ports are provided by SFP sockets.

All eight gigabit ports (4+4) are usable without restrictions for uplink aggregation to an Ethernet Metropolitan Area Network (E-MAN). The FRM220A-GSW/SNMP card transmits Ethernet between the subscriber equipment (bridge/modem or network interface card) and the E-MAN. The card provides a user-networking interface with Ethernet packets. This card is capable of providing high bandwidth for assembling Ethernet traffic. The FRM220A-GSW/SNMP card is not only the system aggragate/trunk module, but also the system's control module, providing OAM / IP Management function.

Application



Comparison Table

Chassis Type	Slot	Power Type	NMC	Ethernet Aggregation Card	Chassis Cascade
FRM220-CH20	20	AC, DC, AD, AA, DD	✓		✓
FRM220A-CH20	20	AC, DC, AD, AA, DD		✓	
FRM220-CH08	8	AC, DC, AD, AA, DD	✓		

Note: AC: AC Power DC: DC Power AD: AC+DC Power AA: AC+AC Power DD: DC+DC Power

Ordering Information

Model Name	Type	Description
FRM220-CH20	Chassis	2U 20-Slot rack mount chassis with 20 line card blank plate
FRM220A-CH20	Chassis	2U 20-Slot rack mount chassis with 20 line card blank plate
FRM220-AC	Power	Chassis power module 100 ~ 240 VAC, IEC connector 200W
FRM220-DC24	Power	Chassis power module 18 ~ 36 VDC, 3 pin terminal block 200W
FRM220-DC48	Power	Chassis power module 36 ~ 72 VDC, 3 pin terminal block 200W

Chassis

FRM220 – □□□□

Example: FRM220 – CH20

Power Type

FRM220 – □□

Example: FRM220 – AC

In-Band Managed Multi-Service Platform

FRM220-CH08

The FRM220-CH08 is a 1U high 19" Rack, 8 slot modular media converter rack. It provides an economic solution for fiber converter installations in enterprises or central offices. All critical components, power, management module and interface cards are hot swappable, allowing online field replacement. The hot-swappable power modules can be chosen from AC100-240V, DC18-36. or DC 36-75V. The chassis also has alarm relays. Management is supported by installing an NMC card info slot#1 . A number of cards are available that support different protocols including Ethernet, Voice, Data, transponders, FOM and IMUX.

Features

- 1U 19" 8-slot Chassis with AC/DC power redundancy
- Chassis backplane consists of passive components
- All modules and cards support hot-swapping
- Two alarm relays

Specifications

Connectors :
- Console RS232(DB9)
- LAN 10/100 Base TX RJ45

Physical Specifications :
- Dimensions(W x D x H): 440mm x 310mm x 44mm
- Weight: 3.5kg w/o P/S

Environmental Specifications :
- Operating 0°C ~ 60°C
- Storage -10°C ~ 70°C
- Relative humidity 5% ~ 90% non-condensing
- Predicted MTBF : 65,000 hrs

Power Characteristics :
- AC : 100 ~ 240VAC ,150W
- DC24 : 18 ~ 36VDC, DC48: 36 ~ 75VDC, 150W

Certification :
- FCC class A, VCCI class A, CE, RoHS

Power Redundancy

The two FRM220-CH08 chassis power supplies are hot swappable and modular. Installing two into a chassis provides redundancy should a single power supply fail. A fully loaded chassis can run continuously with only one power module fitted into the chassis.

Cooling Fan

To further increase system reliability, the FRM220-CH08 chassis is fitted with two fixed fans on each power unit. The fans rotate speed status can be shown through NMC management.

Network Management

The FRM220-CH08 chassis requires an NMC (Network Management Controller) card which must be installed into the first slot of chassis. The NMC card allows a network administrator the ability to configure and monitor the status of the blades.
Management can be achieved locally over RS232, or over the network by Telnet, Web or SNMP If the blades support Ethernet in the First Mile (IEEE 802.3ah), then the management module can also configure and monitor the status of a remote CPE.

Protocol Support

The FRM220-CH08 chassis has been designed as a Multi-service platform. This allows network administrators to deploy the chassis in a wide range of networks. Technologies supported by the chassis included Fast/Gigabit Ethernet, E1/T1, V35/X21/RS530, Serial RS485/422, Voice FXO/FXS, Repeater, Fiber Multiplexer, E1 Inverse Multiplexer and 10G, 2.7G Transponders.

Chassis Overview

Ordering Information

Chassis	Type	Power(option)
FRM220-CH08	Chassis	1U 8 slots rack mount chassis with 8 line card blank plate
FRM220-CH08-AC	Power	Chassis power module 100 ~ 240 VAC, IEC connector
FRM220-CH08-DC24	Power	Chassis power module 18 ~ 36 VDC, 3 pin terminal block
FRM220-CH08-DC48	Power	Chassis power module 36 ~ 72 VDC module, 3 pin terminal block

Chassis
FRM220 – □□□□
Example: FRM220 – CH08

Power Type
FRM220 – CH08 – □□
Example: FRM220 – CH08 – DC24

FRM220 Slide-in Card Chassis

The FRM220 Chassis Product line includes various metal chassis sizes, which can hold from one to twenty FRM220 slide-in modules. The FRM220-CH01 is one slot chassis, which can be installed with one single width blade card for stand-alone applications. The available power options are external AC adapter, built-in AC, DC power or built-in AC+DC, AC+AC, DC+DC redundant power. The FRM220-CH01M is one slot chassis with DB9 console port for local management, which can be installed with one single width blade card for stand-alone applications. The available power options are built-in AC, DC or built-in AC+DC redundant power. The FRM220-CH02 is a two slot chassis, which can be installed with one double width blade card for stand-alone applications. The only available power supply option is an external AC adapter. The FRM220-CH02M is a two slot chassis with DB9 console port for local management, which can be installed with either one or two single width blade cards or one double width blade card. The available power supplies are built-in AC, DC or AC+DC redundant power. The FRM220-CH02/NMC is a two slot chassis and can be SNMP managed when installing one FRM220-NMC card for Web, Telnet, Console and SNMP management. The FRM220-CH02/NMC can be installed with either one or two single width blade cards or one double width blade card. The FRM220-CH02/NMC available power options are built-in AC, DC or AC+DC redundant power.

FRM220 One Slot Chassis

FRM220-CH01

FRM220-CH01 (w/External adapter)

FRM220-CH01 (Power built-in)

Features :

- One slot chassis for FRM220 Single width blade line cards.
- Available in six types: external power adapter or power built-in AC, DC, AC+DC, AC+AC or DC+DC
- Fanless

Power Input :

- AC power 100 ~ 240VAC
- DC power 18 ~ 72VDC
- External Adapter
  Input voltage 100 ~ 240VAC 50/60Hz
  Output voltage 12VDC 1A

Dimensions (D x W x H) :

External adapter : 160 x 88 x 24mm
Internal power : 180 x 135 x 35mm

FRM220 One Slot Chassis with Console Port

FRM220-CH01M

Features :

- One slot chassis for FRM220 Single width blade line cards.
- Supports DB9 console port for local management
- Available in three types: power built-in AC,DC,AC+DC
- Fanless

Dimensions (D x W x H) : 201 x 135 x 35mn

Power Input (option) :

- AC power 100 ~ 240VAC
- DC power 18 ~ 72VDC

Comparison Table

Chassis Type	Slot	Power Type	Console Port	Console Fan	NMC
FRM220-CH01	1	DC12, AC, DC, AD, AA, DD			
FRM220A-CH01M	1	AC, DC, AD	✓		
FRM220-CH02	2	DC12			
FRM-CH02/NMC	2	AC, DC, AD		✓	✓
FRM220A-CH02M	2	AC, DC, AD	✓	✓	

Note: DC12: AC Adapter AC:AC Power DC: DC Power AD: AC+DC Power AA: AC+AC Power DD: DC+DC Power

FRM220 Two Slot Chassis

FRM220-CH02

Features :

- Two slot chassis for FRM220 line cards.
- Supports either one or two single width blades or one double width blade.
- Power Type: external power adapter
- Fanless

Dimensions (D x W x H) : 139 x 88 x 44mn

Power Input (option) : External Adapter: Input voltage 100 ~ 240VAC 50/60Hz, Output voltage 12VDC 1A

FRM220 Two Slot Chassis with Console port

FRM220-CH02M

Features :

- Two slot chassis for FRM220 line cards.
- Supports backplane connection between two slots
- Supports DB9 console port for local management
- Support either one or two single width blades or one double width blade.
- Available in three types: power built-in AC, DC, AC+DC
- Cooling Fan

Dimensions (D x W x H) : 220 x 168 x 45mn

Power Input (option) : • AC power 100 ~ 240VAC • DC power 18 ~ 72VDC

FRM220 SNMP manageable Two Slot Chassis

FRM220-CH02/NMC

Features :

- Two slot chassis for FRM220 line cards.
- Supports backplane connection between two slots
- Telnet, Web, Console, SNMP manageable via NMC card (not included)
- Support either one or two single width blades or one double width blade.
- Available in three types: power built-in AC, DC, AC+DC
- Cooling Fan

Dimensions (D x W x H) : 220 x 168 x 45mn

Power Input (option) : • AC power 100 ~ 240VAC • DC power 18 ~ 72VDC

Ordering Information

Model Name	Description
FRM220-CH01	1 Slot Chassis with 100 ~240VAC to 12VDC adapter
FRM220-CH01-AC	1 Slot Chassis with 100 ~240VAC
FRM220-CH01-DC	1 Slot Chassis with 18 ~75VDC
FRM220-CH01-AD	1 Slot Chassis with 100~240VAC + 18 ~75VDC
FRM220A-CH01M-AC	1 Slot Chassis with console port and 100 ~240VAC
FRM220A-CH01M-DC	1 Slot Chassis with console port and 18 ~75VDC
FRM220A-CH01M-AD	1 Slot Chassis with console port and AC 100~240V + DC 18 ~75V
FRN220-CH02	2 slots Chassis with 100 ~240VAC to 12VDC adapter
FRM220-CH02M-AC	2 slots Chassis with console port and 30W 100 ~240VAC
FRM220-CH02M-DC	2 slots Chassis with console port and 30W 18 ~75VDC
FRM220-CH02M-AD	2 slots Chassis with console port and 30W AC 100~240V + DC 18 ~75V
FRM220-CH02M-2-AC	2 slots Chassis with console port and 12W 100 ~240VAC
FRM220-CH02M-2-DC	2 slots Chassis with console port and 12W 18 ~75VDC
FRM220-CH02M-2-AD	2 slots Chassis with console port and 12W AC 100~240V + DC 18 ~75V
FRM220-CH02/NMC-AC	2 slots Chassis with 100 ~240VAC , optional NMC card
FRM220-CH02/NMC-DC	2 slots Chassis with 18 ~75VDC , optional NMC card
FRM220-CH02/NMC-AD	2 slots Chassis with AC 100~240V + DC 18 ~75V , optional NMC card

FRM220 – □□□□
Example: FRM220 – CH01

Chassis Type Power Type
FRM220A – □□□□ – □□
Example: FRM220A – CH01M – DC

Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Product Name	Page	FRM220-CH20	FRM220A-CH20	CH08
FRM220-NMC	Network Management Controller	1-9	✓		✓
FRM220A-GSW/SNMP	Gigabit Ethernet Aggregate Switch Card	1-10		✓	
FRM220-10G-SS	10G 3R transponder SFP+ to SFP+	1-11	✓		✓
FRM220-10G-SXX	10G 3R transponder SFP+ to XFP fiber protection	1-12	✓		✓
FRM220-4G-2S	4G multi-rate 2R transponder SFP to SFP	1-13	✓		✓
FRM220-4G-3S	4G multi-rate 2R transponder SFP to SFP fiber protection	1-14	✓		✓
FRM220-2.7G-2S	2.7G multi-rate 3R transponder SFP to SFP	1-15	✓		✓
FRM220-2.7G-3S	2.7G multi-rate 3R transponder SFP to SFP Fiber Protection	1-16	✓		✓
FRM220-Protection	1+1 Fiber optical protection switch	1-17	✓		✓
FRM220-MD40	4 Ch CWDM Mux/Demux (1550, 1570, 1590, 1610)nm	1-18	✓		✓
FRM220-MD80	8 Ch CWDM Mux/Demux (1470 ~ 1610)nm	1-18	✓		✓
FRM220-MD40 WA/WB	4 Ch single fiber CWDM MUX/DEMUX	1-19	✓		✓
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-port 1000Base-X OAM/IP managed switch	1-20	✓	✓	✓
FRM220-10/100AS-2	2-Port 10/100Base-TX to 2-port 100Base-FX, OAM/IP media converter	1-22	✓		✓
FRM220-10/100A	10/100Base-TX to 100Base-FX, OAM/IP media converter	1-23	✓		✓
FRM220A-ESW-G2G02XM	Hardened Gigabit Ethernet Managed Switch	1-24	✓	✓	✓
FRM220A-FSW103	3x 10/100TX + 100FX Managed Converter	1-25	✓	✓	✓
FRM220-10GE-TS	10G Ethernet Converter 10G Base-T to SFP+	1-26	✓		✓
FRM220-10GE-TX	10G Ethernet Converter 10G Base-T to XFP	1-27	✓		✓
FRM220-1000MS	10/100/1000Base-T to 1000Base-X SFP Web smart OAM/IP managed converter	1-28	✓		✓
FRM220-100M	10/100Base-TX to 100Base-FX Web smart OAM/IP managed converter	1-29	✓		✓
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band managed converter	1-30	✓		✓
FRM220-10/100i-2E	2-Port 10/100Base-TX to 100Base-FX media converter	1-31	✓		✓
FRM220-10/100iS-2	Dual Channels 10/100Base-TX to 100Base-FX SFP media converter	1-32	✓		✓
FRM220-ET100	Ethernet over E1 fiber modem	1-33	✓		✓
FRM220-Data	V.35/X.21/RS530/449/232 Fiber modem	1-34	✓		✓
FRM220-E1/T1	E1/T1 Fiber modem	1-35	✓		✓
FRM220-Serial	RS485/232 media converter	1-36	✓		✓
FRM220-FXO/FXS	POTS over Fiber	1-38	✓		✓
FRM220A-Eoe1	Ethernet Bridge over E1	1-39	✓	✓	✓
FRM220A-Eoe1/G	Ethernet Bridge over E1 (GFP)	1-40	✓	✓	✓
FRM220A-iMux5	Ethernet to 5 E1 Mux NIC	1-41	✓	✓	✓
FRM220A-iMux8	Ethernet to 8 E1 Mux NIC	1-42	✓	✓	✓
FRM220A-iMux16	Ethernet to 16 E1 Mux NIC	1-43	✓	✓	✓
FRM220-E1/Data	E1 DSU/CSU	1-44	✓		✓
FRM220-FTEC	E1/T1 Cross Rate Converter	1-45	✓		✓
FRM220-FOM01	E1/T1+100M Ethernet Fiber Multiplexer	1-46	✓		✓
FRM220-FOM04	4-Port E1/T1+100M Ethernet Fiber Multiplexer	1-47	✓		✓

Note: ✓ This card supports Ethernet uplink to the aggregate switch (GSW/SNMP)

Power Type vs Standalone Chassis Compatible Table

Power Type (option)					
	AC: AC Power	**DC:** DC Power	AC, DC	AC, DC	AC, DC
	AD: AC+DC Power	**AA:** AC+AC Power	AD, AA, DD	AD, AA, DD	AD, AA, DD
		DD: DC+DC Power			

Product specifications are subject to change without notice.

Slide-in Card vs Standalone Chassis Compatible Table

Card Name	Product Name	Page	CH02M	CH02/ NMC	CH02	CH01	CH01M
FRM220-NMC	Network Management Controller	1-9					
FRM220A-GSW/SNMP	Gigabit Ethernet Aggregate Switch Card	1-10					
FRM220-10G-SS	10G 3R transponder SFP+ to SFP+	1-11	✓	✓			
FRM220-10G-SXX	10G 3R transponder SFP+ to XFP fiber protection	1-12	✓	✓			
FRM220-4G-2S	4G multi-rate 2R transponder SFP to SFP	1-13	✓	✓		✓	✓
FRM220-4G-3S	4G multi-rate 2R transponder SFP to SFP fiber protection	1-14	✓	✓		✓	✓
FRM220-2.7G-2S	2.7G multi-rate 3R transponder SFP to SFP	1-15	✓	✓			
FRM220-2.7G-3S	2.7G multi-rate 3R transponder SFP to SFP Fiber Protection	1-16	✓	✓			
FRM220-Protection	1+1 Fiber optical protection switch	1-17	✓	✓		✓	✓
FRM220-MD40	4 Ch CWDM Mux/Demux (1550, 1570, 1590, 1610)nm	1-18				✓	
FRM220-MD80	8 Ch CWDM Mux/Demux (1470 ~ 1610)nm	1-18			✓		
FRM220-MD40 WA/WB	4 Ch single fiber CWDM MUX/DEMUX	1-19				✓	
FRM220A-1000EAS/X	2-Port 10/100/1000Base-T + 2-port 1000Base-X OAM/IP managed switch	1-20	✓			✓	✓
FRM220-10/100AS-2	2-Port 10/100Base-TX to 2-port 100Base-FX, OAM/IP media converter	1-22	✓			✓	✓
FRM220-10/100A	10/100Base-TX to 100Base-FX, OAM/IP media converter	1-23	✓			✓	✓
FRM220A-ESW-G2G02XM	Hardened Gigabit Ethernet Managed Switch	1-24	✓	✓		✓	✓
FRM220A-FSW103	3x 10/100TX + 100FX Managed Converter	1-25	✓	✓			
FRM220-10GE-TS	10G Ethernet Converter 10G Base-T to SFP+	1-26	✓	✓			
FRM220-10GE-TX	10G Ethernet Converter 10G Base-T to XFP	1-27	✓	✓			
FRM220-1000MS	10/100/1000Base-T to 1000Base-X SFP Web smart OAM/IP managed converter	1-28	✓	✓		✓	✓
FRM220-100M	10/100Base-TX to 100Base-FX Web smart OAM/IP managed converter	1-29	✓	✓		✓	✓
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band managed converter	1-30	✓	✓		✓	✓
FRM220-10/100i-2E	2-Port 10/100Base-TX to 100Base-FX media converter	1-31	✓	✓		✓	✓
FRM220-10/100iS-2	Dual Channels 10/100Base-TX to 100Base-FX SFP media converter	1-32	✓	✓		✓	✓
FRM220-ET100	Ethernet over E1 fiber modem	1-33	✓	✓		✓	✓
FRM220-Data	V.35/X.21/RS530/449/232 Fiber modem	1-34	✓	✓		✓	✓
FRM220-E1/T1	E1/T1 Fiber modem	1-35	✓	✓		✓	✓
FRM220-Serial	RS485/232 media converter	1-36	✓	✓		✓	✓
FRM220-FXO/FXS	POTS over Fiber	1-38	✓	✓		✓	✓
FRM220A-Eoe1	Ethernet Bridge over E1	1-39	✓	✓		✓	✓
FRM220A-Eoe1/G	Ethernet Bridge over E1 (GFP)	1-40	✓	✓		✓	✓
FRM220A-iMux5	Ethernet to 5 E1 Mux NIC	1-41	✓	✓		✓	✓
FRM220A-iMux8	Ethernet to 8 E1 Mux NIC	1-42	✓	✓		✓	✓
FRM220A-iMux16	Ethernet to 16 E1 Mux NIC	1-43	✓		✓		
FRM220-E1/Data	E1 DSU/CSU	1-44	✓	✓		✓	✓
FRM220-FTEC	E1/T1 Cross Rate Converter	1-45	✓	✓			✓
FRM220-FOM01	E1/T1+100M Ethernet Fiber Multiplexer	1-46	✓	✓			✓
FRM220-FOM04	4-Port E1/T1+100M Ethernet Fiber Multiplexer	1-47	✓		✓		

Power Type vs Standalone Chassis Compatible Table

Power Type (option)							
	DC12: AC Adapter **AD:** AC+DC Power	**AC:** AC Power **AA:** AC+AC Power	**DC:** DC Power **DD:** DC+DC Power	AC, DC, AD	AC, DC, AD	DC12	DC12, AC, DC, AD, AA, DD	AC, DC, AD

Network Management Controller

FRM220-NMC

The FRM220-NMC is a Network Management Controller card that can be placed in a compatible FRM220 series chassis to provide network management functions. The management interface supports a local RS-232 serial console or remote TCP/IP management by Telnet, HTTP or SNMP protocols. The card is designed to be hot swapped so that it may be field replaced without affecting any online service of any other rack cards. The card also supports online firmware upgrade from TFTP server, using any user interface. Support for any standard NMS is provided by the included enterprise MIB file. CTC Union also provides and maintains their own EMS (Element Management System) which is a Java based client/server manager for monitoring and maintaining a large number of network elements over a long period of time.

Features

- Supports local / remote monitor and configuration
- Supports local / remote online TFTP f/w upgrade
- Fiber transceiver status & info display
- Supports multiple accesses for SNMP management
- Supports Web GUI management, Telnet, Serial console
- Supports console RS-232 port and 10/100Base-T Ethernet port
- Supports SNMP standard MIB II and enterprise MIB
- Supports NTP time synchronization
- Supports syslog
- Supports 255 entries system log

Specifications

Electrical Interface	• Console RS232 port • LAN 10/100Base-TX
Management Interface	• In-band management: provide all system OAM/IP functions: software updates, and management system interaction through Ethernet port. • Out-band management: supports Web, Telnet and SNMP , EMS management
OAM/IP	• Configuration Management • Performance Management • Fault Management • Status Monitoring
Indications	• PWR, Fan, Alarm Act, STK, LAN LNK/SPD
Dimensions	• 155 x 88 x 23mm (D x W x H)
Weight	• 0.12kg
Temperature	• 0 ~ 60°C (Operating) , -10 ~ 70°C (Storage)
Humidity	• 10 ~9 0% non-condensing
Certification	• CE, FCC, LVD, RoHS
MTBF	• 65,000 hrs

Ordering Information

Model Name	Description
FRM220-NMC	Network Management Controller card, support web, telnet, console, SNMP functions

Note: The card is suitable for using in CH01 standalone chassis.

Gigabit Ethernet Aggregate Switch Card

FRM220A-GSW/SNMP

The FRM220A incorporates a 24+4 Gigabit Ethernet Switch. Twenty ports supply each slot of the 2U 20-slot chassis with an electrical gigabit Ethernet uplink with the remaining four electrical gigabit ports accessible via the rear of the chassis. The additional four ports are provided by SFP sockets. All eight gigabit ports (4+4) are usable without restrictions for uplink aggregate to the Ethernet Metropolitan Area Network (E-MAN). The FRM220A-GSW/SNMP card transmits Ethernet between the subscriber equipment (bridge/modem or network interface card) and the E-MAN. The card provides a user-networking interface with Ethernet packets. This card is capable of providing high bandwidth for assembling Ethernet traffic. The FRM220A-GSW/SNMP card is not only the system aggregate/trunk module, but also the system's control module, providing OAM Management functions.

Features

- Provides chassis aggregation via 4 electrical (RJ-45) 10/100/1000T ports plus 4 optical (SFP) 1000X/2500Base-X Gigabit Ethernet ports
- Optical Ethernet ports Support stacking in Ring or Chain topology
- Each chassis slot has one gigabit Ethernet uplink
- Provides Web, Telnet, SNMP for out-band management
- Supports IEEE802.1d Ethernet bridge function between trunk Ethernet ports
- Supports Rapid Spanning Tree Protocol (RSTP) for the trunk interfaces per IEEE 802.1w
- Support automatic source MAC learning and block duplicate ones
- Supports IEEE 802.1q Port-base VLAN and Tag-base VLAN
- Supports static VLAN management
- Supports Link Aggregation in IEEE 802.3ad that allows GbE links to be aggregated together as logical link.
- Support Simple Network Time Protocol (SNTP)
- Supports VLAN level QoS function and 4 priority queues for QoS
- Supports f/w upgrade via http

Specifications

Trunk Interface	• 4x 10/100/1000Base-T plus 4x 1000Base-X/ 2500Base-X GbE Switch trunk card. • Auto-adaptive between full-duplex and half-duplex • Operation modes for 10, 100 , 1000 Mbps operation speed on RJ45 trunk port basis. • The system only supports full-duplex mode for 1000 Mbps. • Supports both RJ45 and optical SFP (Mini-GBIC) connectors
Capacity	• Supports up to 20 service cards
Management Interface	• In-band management: provide all system OAM functions: software updates, and management system interaction through Ethernet trunk port. • Out-band management: supports Web, Telnet and SNMP, EMS management
Indications	PWR, FAN, Alarm, STK
Dimensions	142x200x26mm (DxWxH)
Weight	0.5kg
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	5 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

Ordering Information

Model Name	Description
FRM220-GSW/SNMP	Gigabit Ethernet Aggregate switch card supports web, telnet, SNMP functions

10G 3R Transponder

FRM220-10G-SS

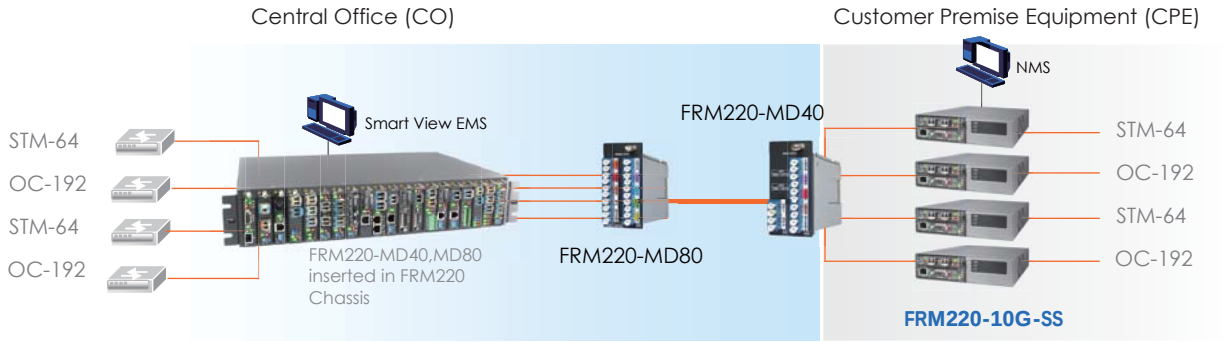
The FRM220-10G-SS is a 10G fiber to fiber 3R repeater and transponder. Based on a number of 10 Gigabit Fiber standards, these transponders support SFP+ to SFP+ (SS) fiber connections. The transponders are protocol transparent, providing 3R (Re-amplification, Re-shaping and Re-clocking) regeneration between these different optical module types. One of the major applications for this converter is in connecting proprietary transceiver equipment to CWDM or DWDM when these 'colored' optical modules are not available for the proprietary equipment. With transparent bi-directional forwarding capability between the 2 fiber media, the FRM220-10G brings you the best and simplest solution for your 10G conversion between fiber and fiber.

Features

- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (1xFC, 2xFC, 4xFC, 8xFC, 10xFC)
- Network management via Web, Telnet, SNMP in central FRM220 chassis(10 cards in chassis max.)
- Protocol transparent 3R fiber media transponder / repeater (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- Extend 10G Ethernet transmission over fiber
- Useful as a 'Transponder' in CWDM or DWDM systems for 10G Ethernet/Fiber Channel/STM-64
- Supports Client / Line loop back tests
- Serial console for stand-alone management when inserted in CH02M Single Slot Chassis
- SFP+ Power supplies: +3.3V

Specifications

Optical Interface	Connector	LC, 1x Line SFP+ to 1x Client SFP+
	Traffic Format	OC-192/STM-64 (9.95328Gbps) 10 Gigabit Ethernet LAN(10.3125Gbps) G.709 OTU2 (10.709225Gbps) **Fiber Channel** 1xFC(1.062 Gbps); 2xFC(2.125 Gbps); 4xFC(4.25 Gbps); 8xFC(8.5 Gbps); 10xFC(10.51875 Gbps)
	Regeneration	Re-amplification Re-shaping, Re-timing
	Loopback	Line / Client
	Fiber	SM 9/125μm MM 50/125μm or 62.5/125μm
	Wavelength	CWDM 1470 ~ 1610nm DWDM 1529.55 ~ 1565.50nm
Indications		LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input		Card : 12VDC , Standalone : AC,DC option
Power Consumption		<10W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.15kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-10G-SS	10G 3R transponder , SFP+ to SFP+ ,(optional SFP+ module)

Note: The card is suitable for using in CH02M standalone chassis.

10G 3R Transponder with Optical Line Protection

FRM220-10G-SXX

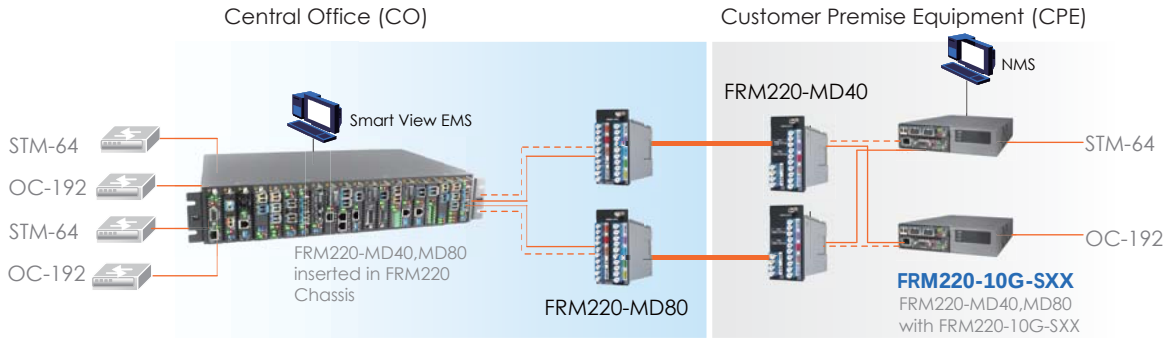
The FRM220-10G-SXX is a 10G fiber to fiber 3R repeater and transponder. Based on 10 Gigabit Fiber standards, the transponder support SFP+ to XFP (SX) or XFP to XFP (XX) fiber connections. 1+1 Automatic optical line Protection Switching is supported for the aggregate XFP fiber ports. The transponder is protocol transparent, providing 3R (Re-amplification, Re-shaping and Re-clocking) regeneration between these different optical module types. One of the major applications for this converter is in connecting proprietary transceiver equipment to CWDM or DWDM when these 'colored' optical modules are not available for the proprietary equipment. With transparent bi-directional forwarding capability between the 2 fiber media, the FRM220-10G-SXX brings you the best and simplest solution for your 10G conversion between fiber and fiber.

Features

- Multiple protocol supported 10G Ethernet, STM-64, OC-192, G.709 OTU2, Fiber Channel (1xFC, 2xFC, 4xFC, 8xFC, 10xFC)
- Network management via Web, Telnet, SNMP in central FRM220-CH20 chassis(10 cards in chassis max.)
- Protocol transparent 3R fiber media transponder / repeater (Re-amplification, Re-shaping and Re-clocking)
- Promotes flexibility and eases management with pluggable SFP+ or XFP transceiver
- Features two 10G ports offering multiservice 10G transponder and regenerator function
- Provides superior optics capabilities resulting in extended transport distances for regional application.
- Extend 10G Ethernet transmission over fiber Useful as a 'Transponder' in CWDM or DWDM
- systems for 10G Ethernet/Fiber Channel/STM-64 Supports Client / Line loop back tests
- Serial console for stand-alone management When inserted in CH02M dual Slot Chassis
- XFP/SFP+ Power supplies: +5.0V, -5.2V, +3.3V and +1.8V
- Support reference clock output
- Support 1+1 optical Line Protection

Specifications

Optical Interface	Connector	LC
		1x Line SFP+ to 2x Client XFP
		1x Line SFP+ to 1x Client XFP
		1x Line XFP to 1x Client XFP
	Traffic Format	OC-192/STM-64 (9.95328Gbps)
		1 Gigabit Ethernet (1.25Gbps)
		10 Gigabit Ethernet LAN(10.3125Gbps)
		G.709 OTU2 (10.709225Gbps)
		Fiber Channel
		1xFC(1.062 Gbps); 2xFC(2.125 Gbps);
		4xFC(4.25 Gbps); 8xFC(8.5 Gbps);
		10xFC(10 Gbps)
	Regeneration	Re-amplification
		Re-shaping, Re-timing
	Loopback	Line / Client
	Fiber	SM 9/125µm
		MM 50/125µm or 62.5/125µm
	Wavelength	Depends on SFP+ or XFP
Indications		LED (Power, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input		Card : 12VDC , Standalone : AC,DC option
Power Consumption		<10W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.15kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-10G-SXX	10G 3R SFP+ to XFP fiber protection, (optional SFP+, XFP module)

Note: The card is suitable for using in CH02M standalone chassis.

4G 2R Transponder

FRM220-4G-2S

The FRM220-4G-2S is a 4G 2R optical regeneration device, which consists of Re-amplification and Re-shaping. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. When the FRM220-4G-2S card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and perform diagnostic loop backs.

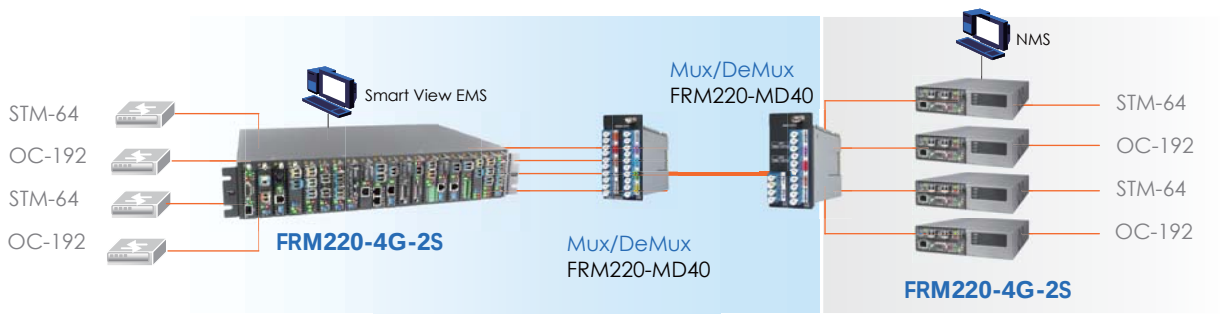
Features

- Multiple protocol supported at bit rates 28Mbps to 4.25Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2, FC-4)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- Local configuration via DB9 console port (when placed in CH01M or CH02M)
- Digital Diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping)
- Facility loopback on both Client / Line sides
- Detect transceiver transmitter error Alarm

Specifications

Optical Interface	Connector	SFP LC
	Data rate	28Mbps ~ 4.25Gbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B) CWDM 1470 ~ 1610nm
Indications		LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 7W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Managed 4G 2R Transponder



Ordering Information

Model Name	Description
FRM220-4G-2S	4G 2R Transponder, (optional SFP module)

Note: The card is suitable for using in CH01M standalone chassis.

4G 2R Transponder with Optical Line Protection

FRM220-4G-3S

The FRM220-4G-3S is a 2R 4G optical regeneration device, which consists of Re-amplification and Re-shaping. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. 1+1 Automatic optical line Protection Switching is supported for the aggregate fiber ports. When the FRM220-4G-3S card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and perform diagnostic loop backs.

Features

- Multiple protocol supported at bit rates 28Mbps to 4.25Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2, FC-4)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Local configuration via DB9 console port (when placed in CH01M or CH02M)
- Digital Diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping)
- Facility loopback on both Client / Line sides
- 1+1 Optic fiber protection
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- Detect transceiver transmitter error Alarm

Specifications

Optical Interface	Connector	SFP LC
	Data rate	28Mbps to 4.25Gbps
	Regeneration	Re-amplification Re-shaping
	Loop back	Line/Client
	Fiber	MM 62.2/125µm, 50/125µm. SM 9/125µm
	Wavelength	MM 850, 1310nm SM 1310, 1550nm WDM 1310T/1550R, 1550T/1310R CWDM 1470 ~ 1610nm
Indications		LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input		Card : 12VDC , Standalone : AC,DC option
Power Consumption		< 8W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity		10~90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Managed 4G 2R Transponder with Fiber Protection

Client: Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2

Ordering Information

Model Name	Description
FRM220-4G-3S	4G 2R Transponder with fiber protection, (optional SFP module)

Note: The card is suitable for using in CH01M standalone chassis.

2.7G 3R Transponder

FRM220-2.7G-2S

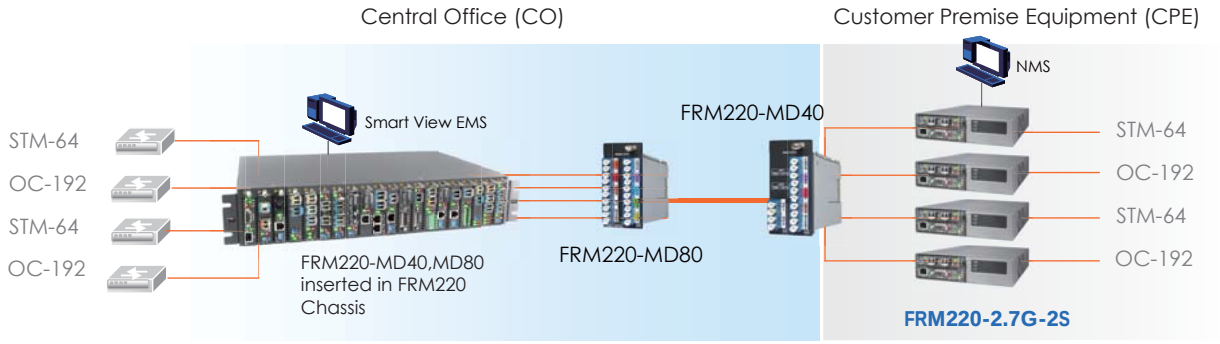
The FRM220-2.7G-2S is a 2.7G 3R optical regeneration device, which consists of Re-amplification, Re-shaping and Re-timing. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. When the FRM220-2.7G-2S card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and set the desired data rate.

Features

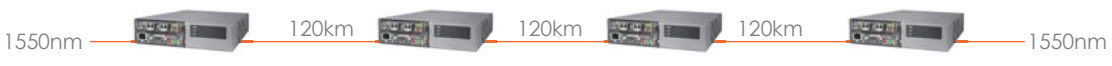
- Multiple protocol supported at bit rates 34.3Mbps to 2.7Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- Local configuration via DB9 craft port In Stand-alone
- Digital Diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping, and Re-clocking)
- Facility loopback on both Client / Line sides
- Dip Switch setting data rate
- Detect transceiver transmitter error Alarm

Specifications

Optical Interface	Connector	SFP LC
	Data rate	E3 to OC-48
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B) CWDM 1470 ~ 1610nm
Indications		LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 10W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



2.7G 3R Repeater



FRM220-2.7G-2S

Ordering Information

Model Name	Description
FRM220-2.7G-2S	2.7G 3R Transponder, (optional SFP module)

Note: The card is suitable for using in CH02M standalone chassis.

2.7G 3R Transponder with Optical Line Protection

FRM220-2.7G-3S

The FRM220-2.7G-3S is a 3R 2.7G optical regeneration device, which consists of Re-amplification, Re-shaping and Re-timing. The transponder card converts a data signal to the correct wavelength for transmission on a specific channel by supporting SFP optics on both line side and client side interfaces. 1+1 Automatic optical line Protection Switching are supported for the aggregate fiber ports. When the FRM220-2.7G-3S card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, fiber link status and alarms. The card can be configured to enable or disable the port, reset the port and set the desired data rate.

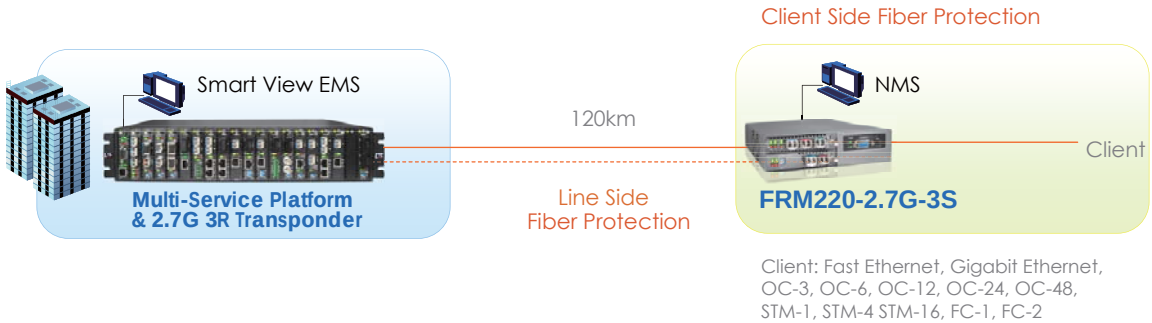
Features

- Multiple protocol supported at bit rates 34.3Mbps to 2.7Gbps (Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2)
- Network management via Web, Telnet, SNMP in central FRM220 chassis
- Link Fault Pass through (LFP)
- Auto Laser Shutdown (ALS)
- Local configuration via DB9 craft port In Stand-alone
- Digital Diagnostic monitoring of SFP module
- Perform optical repeater function (Re-amplification, Re-shaping, and Re-clocking)
- Facility loopback on both Client / Line sides
- 1+1 Optic fiber protection
- Dip Switch setting data rate
- Detect transceiver transmitter error Alarm

Specifications

Optical Interface	Connector	SFP LC
	Data rate	E3 to OC-48
	Regeneration	Re-amplification
		Re-shaping
		Re-clocking
	Loop back	Line/Client
	Fiber	MM 62.2/125µm, 50/125µm.
		SM 9/125µm
	Wavelength	MM 850, 1310nm
		SM 1310, 1550nm
		WDM 1310T/1550R, 1550T/1310R
		CWDM 1470 ~ 1610nm
Indications	LED (PWR, Line Link, Client Link, Test, Loop back, Port Active, Alarm)	
Power Input	Card : 12VDC , Standalone : AC,DC option	
Power Consumption	< 10W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	0.12kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10~90% non-condensing	
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 hrs (25°C)	

Managed 2.7G 3R Transponder with Fiber Protection



Client: Fast Ethernet, Gigabit Ethernet, OC-3, OC-6, OC-12, OC-24, OC-48, STM-1, STM-4 STM-16, FC-1, FC-2

Ordering Information

Model Name	Description
FRM220-2.7G-3S	2.7G 3R Transponder with fiber protection , (optional SFP module)

Note: The card is suitable for using in CH02M standalone chassis.

1+1 Fiber Optical Protection Switch

FRM220-Protection

The Fiber optical protection unit is able to provide fiber path redundancy on a channel by channel basis. These units are particularly well suited for protection in fiber data transmission. The solution includes monitoring capabilities for both working and protection paths. The monitoring is available through the SNMP Management unit. In case of a fiber cut in the protecting path, traffic will be switched over to the protecting path in less than 50 ms.

Features

- 1+1 full optical protection
- Low channel cross talk < -55dB
- Low insertion loss < 5.5dB
- Latch feature, if power is lost the switch remains in its current state
- Protection transition < 50 ms
- Works with any combination of 1 ~16 wavelengths
- Traffic is switched in one of three modes :
  Auto, Semi-Auto, Manual
- Optical Interface Type : LC connectors
- Working and protected lines are physically separated fiber

Specifications

Connecter	LC
LEDs	Power System, Working Path, Protection Path, Work mode
Power	DC 12V In
Restoration Time	50ms
Range	Input PWR :+3 ~ -15dBm(TX), -2~-29dBm(RX). Detection: -5 ~ -29dBm
Loss	Insertion Loss < 5.5dB, Return Loss > 45dB
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	0.9kg
Temperature	0 ~ 60°C (Operating), 20 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	65,000 hours

Ordering Information

Model Name	Description
FRM220-Portection	1+1 Fiber Optical Protection Switch

Note: The card is suitable for using in CH01M standalone chassis.

4Ch/8Ch CWDM Single Fiber MUX/DeMUX

FRM220-MD40
FRM220-MD80

The FRM220-MD40 is 4 channels MUX/DEMUX, modular design card for CWDM wavelengths including 1510nm, 1530nm, 1550nm, 1570nm. The FRM220-MD40-2UP is 4 channels MUX/DEMUX, modular design card for CWDM wavelengths including 1470nm, 1490nm, 1590nm, 1610nm and two upgrade ports for CWDM wavelength ranges of 1503nm ~ 1577nm and 1260nm ~ 1457nm. The FRM220-MD80-1UP is 8 channels MUX/DEMUX, modular design card for CWDM wavelengths including 1470nm, 1490nm, 1510nm, 1530nm, 1550nm, 1570, 1590, 1610nm and one upgrade port for CWDM wavelength range of 1260nm ~ 1457nm. The MUX/DEMUX cards provide the primary wave division and combination functions for CWDM. Line side wave lengths require translation to client side equipment via a transponder card.

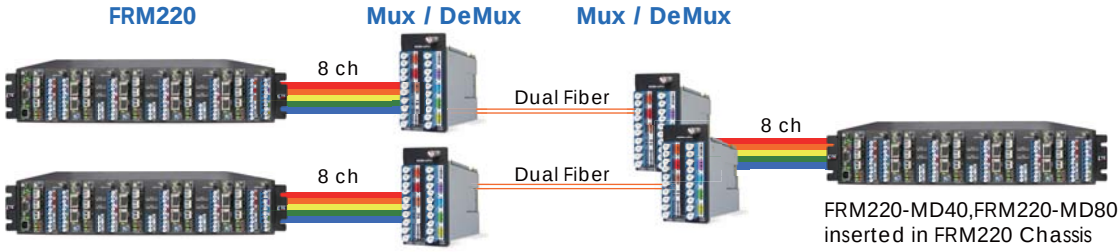
Features

- Full native mode performance
- Optical connectors
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelength

Specifications

Connector	LC
Standard	ITU-T G.694.2
Wavelength	1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm
Upgrade Port	1503nm ~ 1577nm, 1260nm ~ 1457nm
Insertion Loss	MD40 : < 1.8dB
	MD40-2UP : < 2.2dB
	MD80-1UP : < 2.8dB
Return Loss	>45dB
Dimensions	MD40
	155 x 88 x 23 mm (D x W x H)
	MD40-2UP, MD80-1UP
	155 x 88 x 42 mm (D x W x H)
Weight	MD40 : 0.2kg
	MD40-2UP : 0.36kg
	MD80-1UP : 0.38kg
Temperature	0 ~ 60 °C (Operating)
	-10 ~ 70 °C (Storage)
Humidity	0 ~ 95% non-condensing
Certification	RoHS
MTBF	75,000 hours

CWDM Mux/DeMux



Ordering Information

Model Name	Description
FRM220-MD40-5157	4 Ch CWDM Mux/Demux (1510, 1530, 1550, 1570nm)
FRM220-MD40-5561	4 Ch CWDM Mux/Demux (1550, 1570, 1590, 1610nm)
FRM220-MD80	8 Ch CWDM Mux/Demux (1470 ~ 1610nm)

Note: FRM220-MD40 is suitable for using in CH01 standalone chassis
FRM220-MD80 is suitable for using in CH02 standalone chassis

FRM220 – □□□□
Example: FRM220 – MD80

4Ch Single Fiber CWDM MUX/DeMUX

FRM220-MD40 WA/WB

The Single Fiber Optical Multiplexer are available in 4 channels versions and are used to combine signals from the traffic cards on to a single fiber. The FRM220-MD40-WA is 4 channels Single fiber MUX/DEMUX modular design card for CWDM wavelengths including 1470nm, 1510nm, 1550nm, 1590nm. The FRM220-MD40-WB is 4 channels Single fiber MUX/DEMUX, modular design card for CWDM wavelengths including 1490nm, 1530nm, 1570nm, 1610nm. The Single fiber MUX/DEMUX cards provide the primary wave division and combination functions for CWDM. Line side wavelengths require translation to client side equipment via a transponder card.

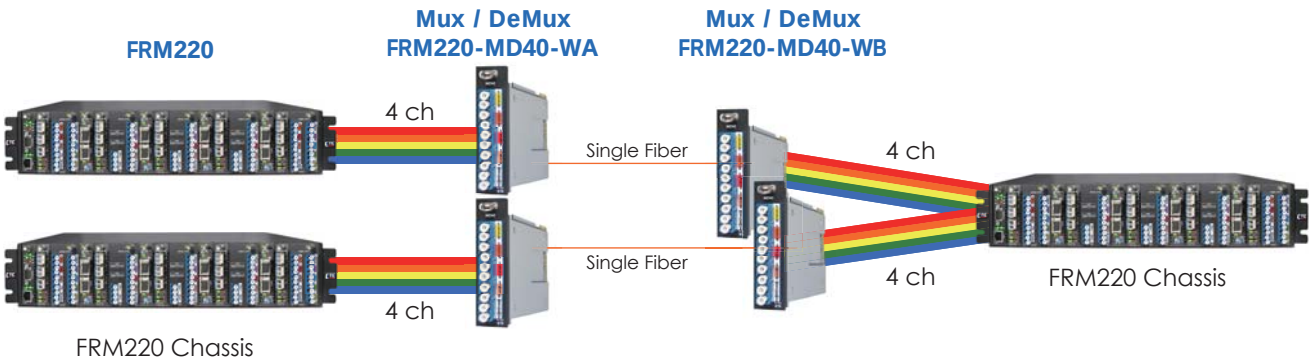
Features

- Full native mode performance
- Optical connectors
- Passive model requires no power
- Protocol transparent, no limitation
- Utilizes industry standard ITU CWDM wavelength

Specifications

Connector	LC
Standard	ITU-T G.694.2
Wavelength	FRM220-MD40-WA:1470, 1510, 1550, 1590nm
	FRM220-MD40-WB :1490, 1530, 1570, 1610nm
Insertion Loss	< 1.8dB
Return Loss	> 45dB
Dimensions	155 x 88 x 23 mm (D x W x H)
Weight	0.2kg
Temperature	0 ~ 60 °C (Operating)
	-10 ~ 70 °C (Storage)
Humidity	0 ~95% non-condensing
Certification	RoHS

CWDM Mux/DeMux



Ordering Information

Model Name	Description
FRM220-MD40-WA	4ch CWDM Mux/Demux (1470, 1510, 1550, 1590nm), Bidi on WAN port
FRM220-MD40-WB	4ch CWDM Mux/Demux (1490, 1530, 1570, 1610nm), Bidi on WAN port

Note: The card is suitable for using in CH01 standalone chassis.

FRM220 – □□□□ – □□

Example: FRM220 – MD40 – WA

2-Port 10/100/1000Base-T + 2-Port 1000Base-X OAM/IP Managed Switch

FRM220A-1000EAS/X

The FRM220A-1000EAS/X is an IEEE802.3ah OAM compliant dual copper to dual fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-TX and 100/1000Base-X with SFP. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

- 2-port 10/100/1000Base-T to 2-port 100/1000Base-X SFP
- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 10K bytes Jumbo packets (max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tagged and Port based VLAN
- Supports Flow control (Pause)
- Supports OAM remote loopback to assist in diagnosing network problems
- Supports bandwidth control
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Online local / remote f/w upgrade
- Fiber Redundant
- Spanning Tree protocol
- Port Trunking
- Default port and 802.1p tag priority QoS
- Fixed or weighted priority QoS

Specifications

Optical Interface	Connector	SFP LC
	Data rate	100/1000Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 550m, 2km, SM 15/30/50/80/120km WDM 20/40/60km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP 100Base-TX Cat.5, 5e or higher 1000Base-T Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u, IEEE802.1q
Indications		LED (Power, FX-Link, Test, TX-Link, TX-SPD)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 8W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

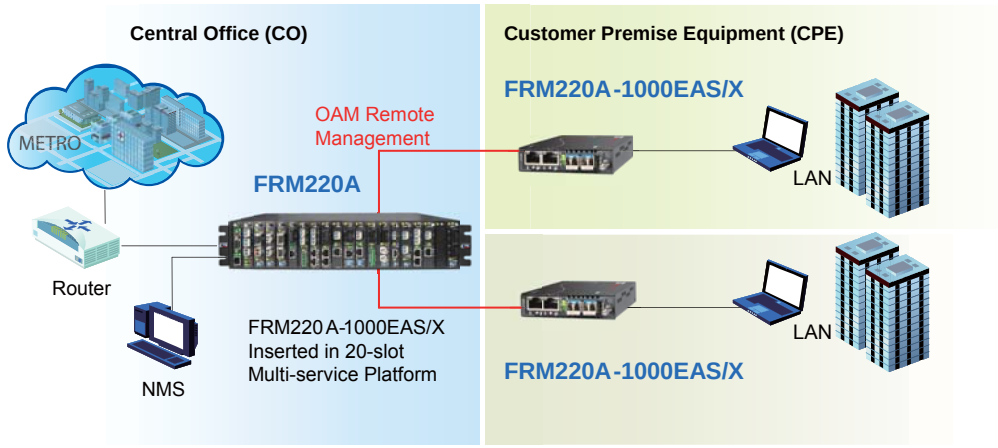
Ordering Information

Model Name	Description
FRM220-1000EAS/X	2x 10/100/1000Base-T + 2x 1000Base-X with OAM/IP management, (optional SFP)

Note: The card is suitable for using in CH01 standalone chassis.

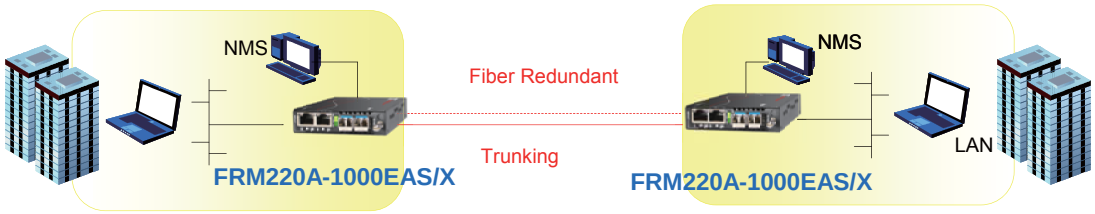
FRM220A-1000EAS/X Application

"In the Centrally managed application, the main chassis, all of its cards and all fiber connected remote CPE units can be provisioned and monitored from a single management point"



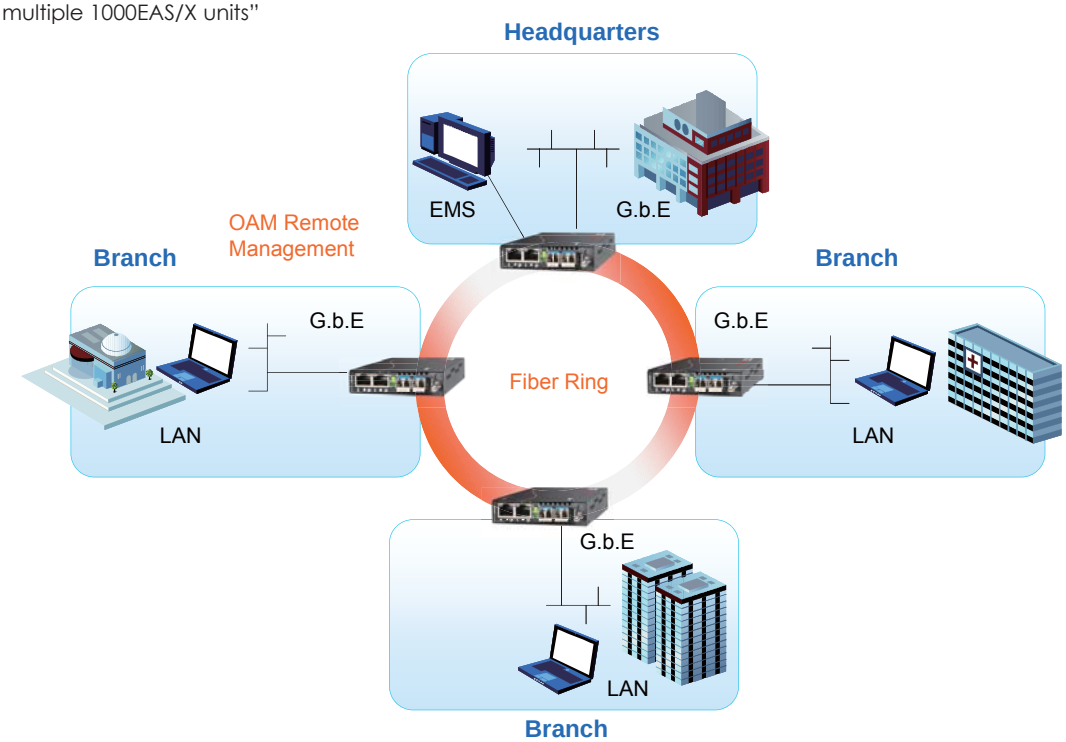
Fiber Redundant / Trunking Application

"Utilizing a special trunking function, the 1000EAS/X can be deployedin stand-alone, point-to-point applications and provide 1+1 redundant fiber protection"



Fiber Ring Application

"In the ring or mesh topology, Spanning Tree Protocol enables a highly resilient network based on multiple 1000EAS/X units"



2-Port 10/100Base-TX + 2-port 100Base-FX, OAM/IP Managed Switch

FRM220-10/100AS-2

The FRM220-10/100AS-2 is an IEEE802.3ah OAM compliant two copper to two fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX with SFP. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managedrack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

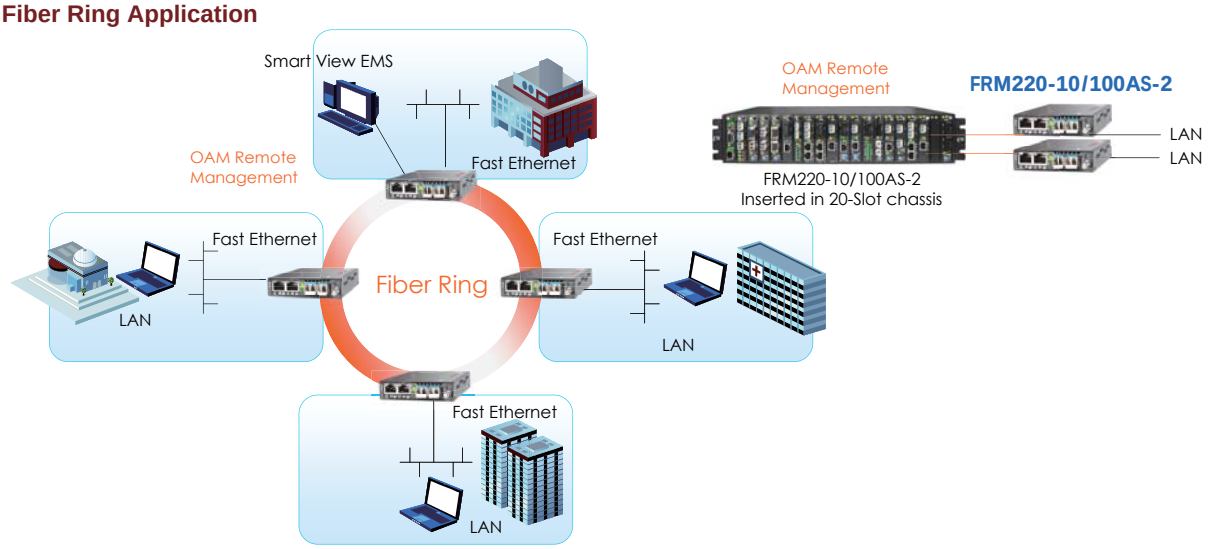
Features

- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- 2-port 10/100Base-TX plus 2-port 100Base-FX SFP
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1536 bytes (max.) packets
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tagged and Port based VLAN
- Supports port trunking
- Bandwidth control Ingress (128K ~ 64M), Engress (128K ~ 8M)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports QoS Port Priority
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Online local / remote f/w upgrade
- Fiber Redundant
- Spanning Tree Protocol

Specifications

Optical Interface	Connector	SFP LC
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u, IEEE 802.1Q
Indications		LED (Power, Test, FX-Link, TX-Speed, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Fiber Ring Application



Ordering Information

Model Name	Description
FRM220-10/100AS-2	2x 10/100Base-TX + 2x 100Base-FX with OAM/IP management(optional SFP)

Note: The card is suitable for using in CH01 standalone chassis.

2-port 10/100Base-TX + 100Base-FX OAM/IP Managed Switch

FRM220-10/100A

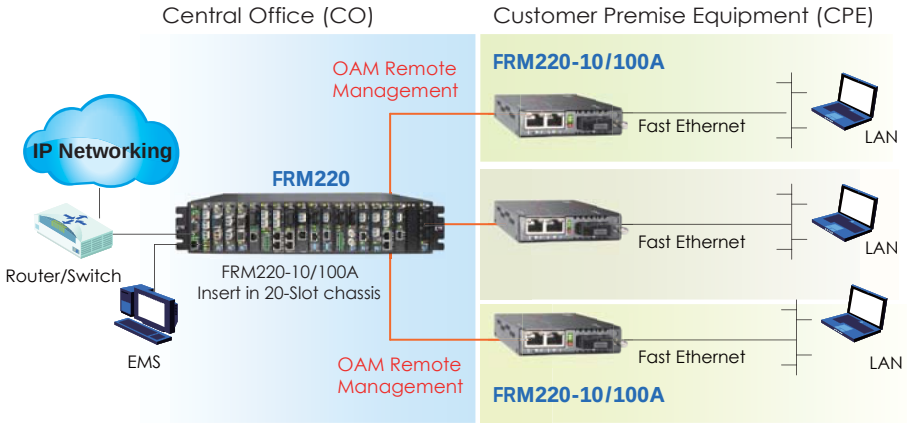
The FRM220-10/100A is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 2x 10/100Base-TX and 100Base-FX with SC, FC or ST connector. With SNMP and Web-based management in the FRM220, the network administrator can monitor, configure and control the activity of each 802.3ah series card and remotely connected OAM compliant converter. By offering 802.3ah OAM Compliant in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

- 2-port 10/100BASE-TX to 100BASE-FX
- Supports local / remote 802.3ah OAM / IP In-band management
- Stand-alone IP Based, Web GUI, Telnet, SNMP management
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 1536 bytes (max.) packets
- Supports Q in Q double tagging
- Supports IEEE 802.1q Tag VLAN
- Bandwidth control Ingress (128K ~ 64M), Engress (128K ~ 8M)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports QoS Port Priority
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Online remote f/w upgrade

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u, IEEE 802.1Q
Indications		LED (Power, Test, FX-Link, TX-Speed, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-10/100A	2x 10/100Base-TX to 100Base-FX with OAM/IP management(optional SFP)

Note: The card is suitable for using in CH01 standalone chassis.

Connector Type / Connectivity Distance

FRM220 – 10/100A – □□□□□

Example: FRM220 – 10/100A – SC002

Connector Type	*Connectivity Distance*
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

Hardened Gigabit Ethernet Managed Switch

FRM220A-ESW-G2G02XM

The FRM220A-G2G02XM is an industrial grade dual copper to dual fiber Gigabit Ethernet managed switch designed to make conversion between 10/100/1000Base-T and 100/1000Base-SX/LX with SFP connector. With SNMP and Web-based management in the FRM220 or FRM220A chassis the network administrator can monitor, configure and control the activity of each FRM220A-G2G02XM switch card locally via the SNMP manager, the functions including bandwidth control, QoS, VLAN, duplex and speed configuration. This managed switch is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, IPX, IP, etc. The FRM220A-G2G02XM managed switch is available in models that support operating temperatures from 0 to 80 degree C.

Features

- 2 Port 10/100/1000BASE-T to 2 Port 100/ 1000BASE-FX Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Support flow control Enable or Disable
- Support Jumbo Frame 10K Packet
- Support 16 Tag VLAN Group
- Support Double VLAN tag (Q-in-Q)
- Support Bandwidth control
- Support Loop Back Test
- Support Link Fault Pass Through (LFP) Function
- Support Auto Laser Shutdown (ALS) Function
- Support local management on FRM220A rack management.
- Console management on stand-alone.
- Support D/D function for SFP fiber transceiver
- Provide Product information for management
- Support the local management (Monitor or Configure status) by the SNMP manager.
- Support FRM220A for Ethernet Aggregation

Specifications

Optical Interface

Connector: SFP-LC
Data rate: 100Mbps, 1000Mbps
Duplex mode: Full duplex
Fiber
MM 50/125μm, 62.5/125μm.
SM 9/125μm
Distance
MM 2km, SM 15/30/50/80/120km,
WDM 20/40/60/80km
Wavelength
MM 1310nm, SM 1310,1550nm
WDM 1310Tx/1550Rx (type A)
1550Tx/1310Rx (type B)

Electrical Interface

Connector: RJ45
Data rate: 10Mbps, 100Mbps
Duplex mode: Half / Full duplex
Cable
10Base-T Cat.3, 4, 5, UTP,
100Base-TX Cat.5, 5e or higher

Standard

IEEE 802.3, IEEE 802.3u, 802.3z, 802.3ab

LED Indications

PWR, LNK1, LNK2, TEST, LAN Link, LAN SPEED

Power

Power Input
DC 12V in
Power Consumption: < 5V

Mechanical

Dimension
155 x 88 x 23mm (DxWxH)
Weight
120g
Physical Characteristics
Housing: Metal

Environmental

Temperature
Operating: 0 ~ 80°C
Storage: -40 ~ 85°C
Humidity
0 ~ 95% non-condensing

Certification

FCC Part 15 Class A,CE Mark

Ordering Information

Model Name	Description
FRM220A-ESW-G2G02XM	2-Port 10/100/1000Base-T to 2-Port 100/1000Base-SX/LX SFP GE Manage Switch

3-Port 10/100Base-TX + 100Base FX Managed Switch

FRM220A-FSW103

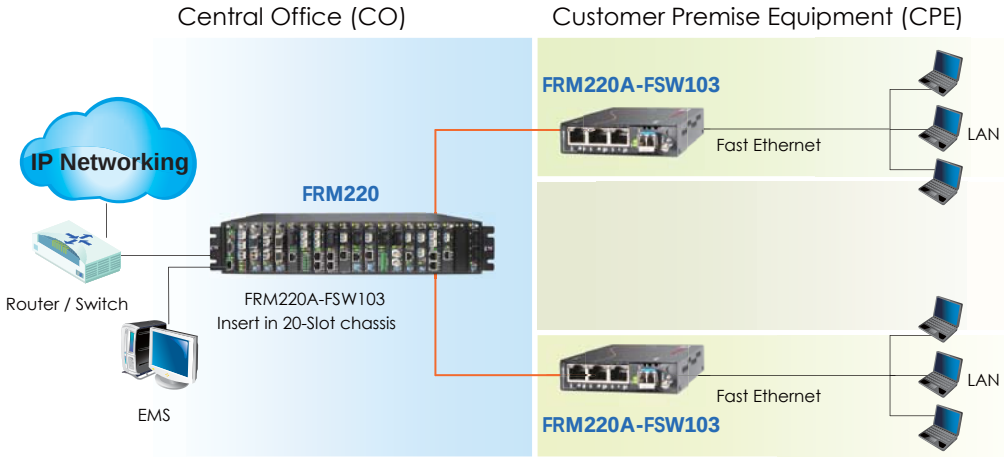
The FRM220A-FSW103 is a 3-port 10/100Base-TX to 100Base-FX SFP fiber slide-in card Ethernet switch designed for central and remote applications. With SNMP and Web-based management in the FRM220 or FRM220A chassis, the network administrator can monitor, configure and control the activity of each FRM220A-FSW103 switch card locally via the SNMP manager. this switch can be completely controlled and monitored from a centrally located managed rack controlling all switch settings including duplex and speed configuration. This switch is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc

Features

- 3 Port 10/100BASE-TX + 1 Port 100BASE-FX Ethernet Switch
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Support flow control
- Forward 1552 bytes (max.) packets in switch mode
- Support Store and forward switch mode
- Support FRM220 chassis management system
- Support FRM220A chassis management System and Ethernet Aggregation
- Support the local management (Monitor or Configure status) by the SNMP manager.
- Support D/D function for SFP fiber transceiver
- Provide Auto Laser Shutdown (ALS) function
- Provide Product information for management
- Support On-Line F/W upgrade (local) by the SNMP manager

Specifications

Optical Interface	Connector	SFP LC
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 80°C (Operating), 0 ~ 80°C (Storage)
Humidity		5 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220A-FSW103	3 x 10/100Base-TX to 100Base-FX Switch, (optional SFP)

Note: The card is suitable for using in CH01 standalone chassis.

10G Ethernet Media Converter

FRM220-10GE-TS

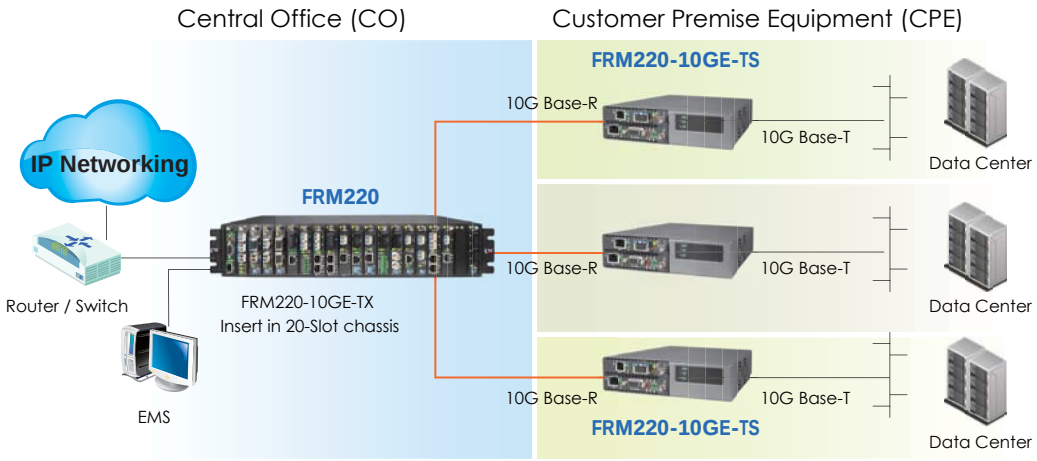
The FRM220-10GE-TS is a copper to fiber 10Gbps Ethernet media converter based on IEEE802.3an and IEEE802.3ae. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis. This converter uses Cat.6a/Cat 7 twisted pair cable as copper transmission media with RJ-45 and 10G optical solution with SFP+ LC connector. The data stream can be converted bi-directionally from 10GBase-T to 10GBase-R and vice versa. With full duplex wire speed forwarding capability between these two media, The FRM220-10GE-TS brings you the best and simplest solution for the 10G Ethernet conversion between copper wire and fiber.

Features

- Network Management via FRM220 Chassis
- Complies with IEEE802.3an 10GBase-T and IEEE802.3ae 10GBase-R
- Real-Time conversion between 10GBase-T and 10GBase-R
- Common used SFP+ fiber interface and RJ45 connector
- Full duplex wire speed forwarding
- Subsidiary device for 10G Ethernet transmission without fiber
- Loopback Test
- Standalone Local Management via CH02M
- Forwarding l0k bytes jumbo packet

Specifications

Optical Interface	Connector	SFP+ LC
	Data rate	10GMbps
	Distance	300m, 10km, 40km, 80km
	Wavelength	1550nm
Electrical Interface	Connector	RJ45
	Data rate	10GMbps
	RS-232	RJ45
	Console port	
	Cable type	Cat.6a, 7
	Distance	95 meters (Cat.7)
Standard		IEEE 802.3an, IEEE 802.3ae
LEDs		SFP+, LR, Link/Act, LBK A/B, SYS
Power		DC 12V In
Power Consumption		< 15W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.55kg
Temperature		0 ~ 40°C (Operating), 0 ~ 50°C (Storage)
Humidity		0 ~ 85% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hrs



Ordering Information

Model Name	Description
FRM220-10GE-TS	10G Base-T RJ45 to 10G-Base-R SFP+, (optional SFP+)

Note: The card is suitable for using in CH02M standalone chassis.

10G Ethernet Media Converter

FRM220-10GE-TX

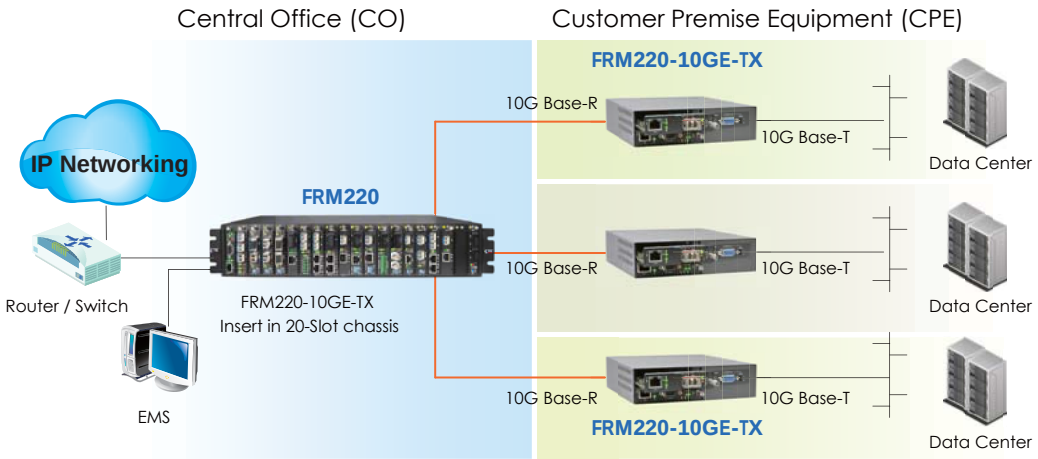
he FRM220-10GE-TX is a copper to fiber 10Gbps Ethernet media converter based on IEEE802.3an and IEEE802.3ae. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis. This converter uses Cat.6a/Cat 7 twisted pair cable as copper transmission media with RJ-45 and 10GE optical solution with XFP LC connector. The data stream can be converted bi-directionally from 10GBase-T to 10GBase-R and vice versa. With full duplex wire speed forwarding capability between these two media, The FRM220-10GE-TX brings you the best and simplest solution for the 10G Ethernet conversion between copper wire and fiber.

Features

- Network Management via FRM220 Chassis
- Complies with IEEE802.3an 10GBase-T and IEEE802.3ae 10GBase-R
- Real-Time conversion between 10GBase-T and 10GBase-R
- Common used XFP fiber interface and RJ45 connector
- Full duplex wire speed forwarding
- Loopback Test
- Standalone Local Management via CH02M
- Forwarding lok bytes jumbo packet

Specifications

Optical Interface	Connector	XFP LC
	Data rate	10GMbps
	Distance	300m, 10km, 40km, 80km
	Wavelength	1550nm
Electrical Interface	Connector	RJ-45
	Data rate	10GMbps
	RS-232	RJ-45
	Console port	
	Cable type	Cat.6a, 7
	Distance	95 meters (Cat.7)
Standard		IEEE 802.3an, IEEE 802.3ae
LEDs		SFP+, LR, Link/Act, LBK A/B, SYS
Power		DC 12V In
Power Consumption		< 15W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.55kg
Temperature		0 ~ 40°C (Operating), 0 ~ 50°C (Storage)
Humidity		0 ~ 85% non-condensing
Certification		CE, FCC, RoHS
MTBF		57,000 hrs



Ordering Information

Model Name	Description
FRM220-10GE-TX	10G Base-T RJ45 to 10G-Base-R XFP, (optional XFP)

Note: The card is suitable for using in CH02M standalone chassis.

Gigabit Ethernet OAM/IP In-band Managed Converter

FRM220-1000MS

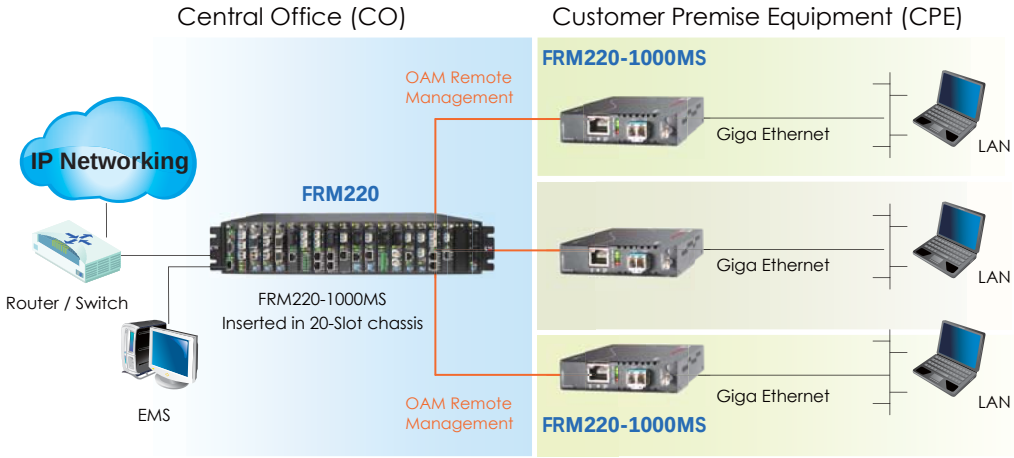
The FRM220-1000MS is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-TX and dual rate 100/1000Base-X with SFP LC connector. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance of both local and remotely connected FRM220-1000MS converters. By offering 802.3ah OAM compliance, this converter can be linked to any 802.3ah compliant fiber switch and support loop back and dying gasp functions. When placed in our centrally controlled and managed rack, all functions of this converter and the remotely connected converter can be configured and monitored via in-band management, including band-width control, duplex, speed, VLAN configuration and more.

Features

- 1 Port 10/100/1000BASE-T to 100/1000BASE-X Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Packet
- Ingress/Egress Bandwidth control
- Supports 802.3ah-OAM/IP in-band management (for standalone unit only)
- Firmware upgrade via Web (for standalone unit only)
- Digital Diagnostic (DOM) SFP Support
- Management Password Setting (for standalone unit only)
- Dying gasp (remote power failure detection on stand-alone)
- Supports Link Fault Pass Through (LFP) Function
- Supports Auto Laser Shutdown (ALS) Function
- Allow IP settings Web or Console management (for standalone unit only)
- Supports D/D function for SFP fiber transceiver
- Supports 16 Tag VLAN Group/ Q-in-Q (for standalone unit only)
- RMON counters (for standalone unit only)

Specifications

Optical Interface	Connector	SFP LC
	Data rate	100/1000Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ45
	Data rate	10Mbps, 100Mbps, 1000Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u IEEE 802.3ab, 802.3z
Indications		LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-1000MS	10/100/1000Base-T to 100/1000Base-X SFP Web smart OAM/IP managed converter. (Optional SFP)

Note: The card is suitable for using in CH01 standalone chassis.

Fast Ethernet OAM/IP In-band Managed Converter

FRM220-100M

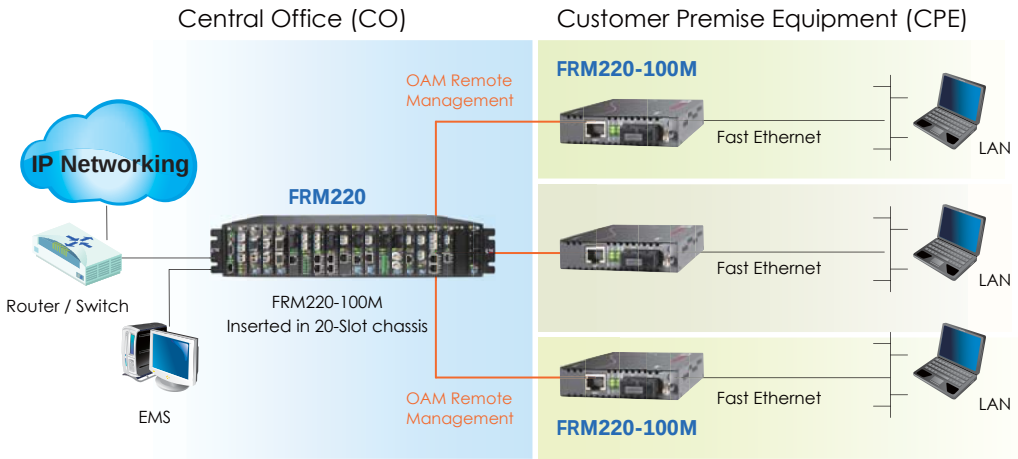
The FRM220-100M is an IEEE802.3ah OAM compliant copper to fiber Fast Ethernet solution designed to make conversion between 10/100Base-TX and 100Base-FX with SC, FC, ST connector. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance of both local and remotely connected FRM220-100M converters. By offering 802.3ah OAM compliance, this converter can be linked to any 802.3ah compliant fiber switch and support loop back and dying gasp functions. When placed in our centrally controlled and managed rack, all functions of this converter and the remotely connected converter can be configured and monitored via in-band management, including band-width control, duplex, speed, VLAN configuration and more.

Features

- 1 Port 10/100BASE-TX to 100BASE-FX Converter
- Auto-Cross over for MDI/MDIX in TP port
- Auto-Negotiation or Manual mode in TP port
- Dying gasp (remote power failure detection) on standalone unit
- Supports Link Fault Pass Through (LFP) Function
- Supports Auto Laser Shutdown (ALS) Function
- Supports flow control Enable or Disable
- Supports Jumbo Frame 9K Packet
- Ingress/Egress Bandwidth control
- Support 802.3ah-OAM/IP in-band management (for standalone unit only)
- Firmware upgrade via Web (for standalone unit only)
- Password Setting (for standalone unit only)
- Allow IP settings Web or Console management (for standalone unit only)
- Supports 16 Tag VLAN Group (for standalone unit only)
- RMON counters (for standalone unit only)
- Supports Double VLAN tag (Q-in-Q) on standalone unit

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)(Option)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (Power, FX-Link, LAN Speed, LAN Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension / Weight		155 x 88 x 23mm (D x W x H) ; 0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-100M	10/100Base-TX to 100Base-FX Web smart OAM/IP managed converter

Note: The card is suitable for using in CH01 standalone chassis.

Connector Type / Connectivity Distance

FRM220 – 100M – □□□□□

Example: FRM220 – 100M – SC002

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

Fast Ethernet In-band Managed Converter

FRM220-10/100i

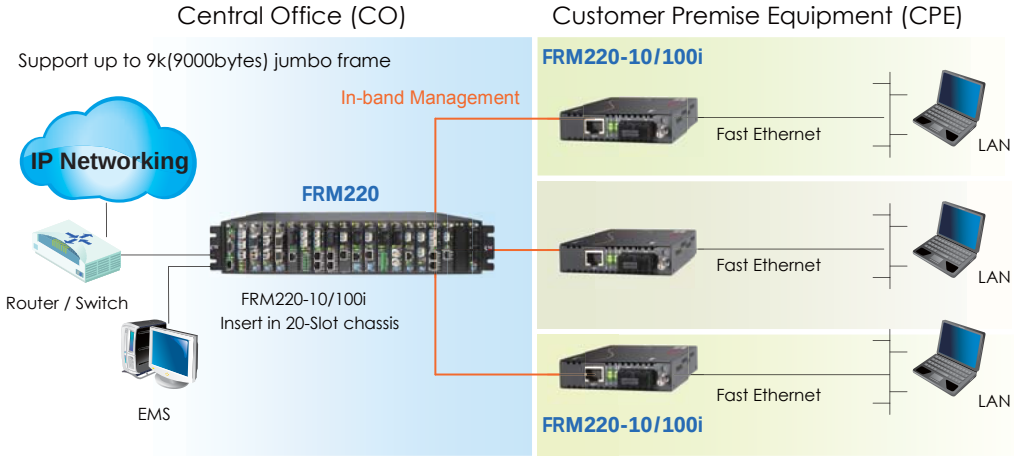
The FRM220-10/100i is a 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

- 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager.
- Bandwidth control (Nx32K or Nx512Kbps)
- Support flow control (Pause)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade
- Must be placed in managed chassis to realize any management features

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u,TS-1000
Indications		LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension / Weight		155 x 88 x 23mm (D x W x H) ; 0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-10/100i	10/100Base-TX to 100Base-FX In-band managed converter

Note: The card is suitable for using in CH01 standalone chassis.

Connector Type / Connectivity Distance

FRM220 – 10/100i – □□□□□

Example: FRM220 – 10/100i – SC002

Connector Type	*Connectivity Distance*
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

Fast Ethernet In-band Managed Converter

FRM220-10/100i-2E

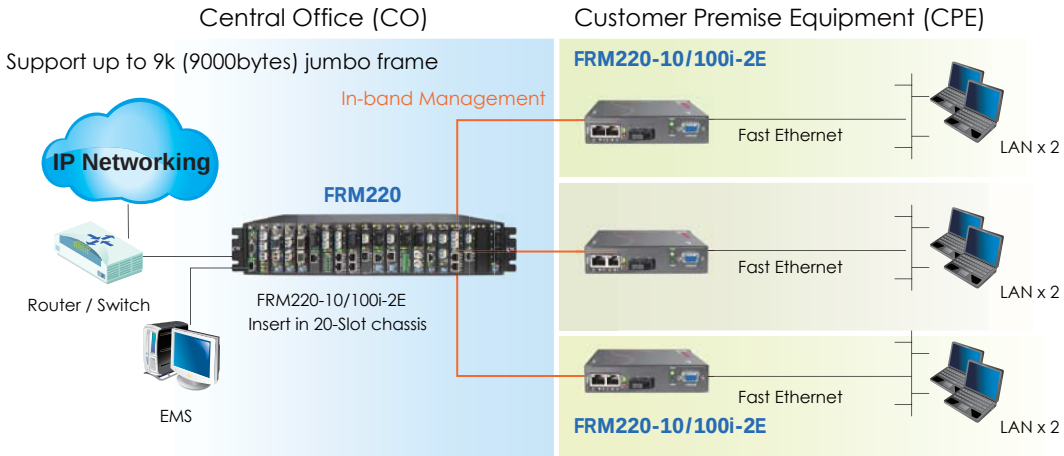
The FRM220-10/100i-2E is a 2-port 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed standalone chassis controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

- 2-port 10/100Base-TX to 100Base-FX Converter
- Auto-Negotiation or forced mode
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Fiber Loop Back Test
- Auto Laser Shutdown (ALS)
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by local management with CH01M standalone chassis.
- Bandwidth control (Nx32K or Nx512Kbps)
- Support flow control (Pause)
- Fiber Hardware Reset (FHR)
- Must be placed in managed chassis to realize any management features

Specifications

Optical Interface	Connector	1x9 (SC,FC,ST)
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u
Indications		LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card: 12VDC Standalone : AC, DC options
Power Consumption		< 5W
Dimension / Weight		155 x 88 x 23mm (D x W x H) ; 0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-10/100i-2E	2-port 10/100Base-TX to 100Base-FX In-band managed converter

Note: The card is suitable for using in CH01 standalone chassis.

Connector Type / Connectivity Distance

FRM220 – 10/100i-2E – □□□□□

Example: FRM220 – 10/100i-2E – SC002

Connector Type	*Connectivity Distance*
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

Dual Channel Fast Ethernet In-band Managed Converter

FRM220-10/100iS-2

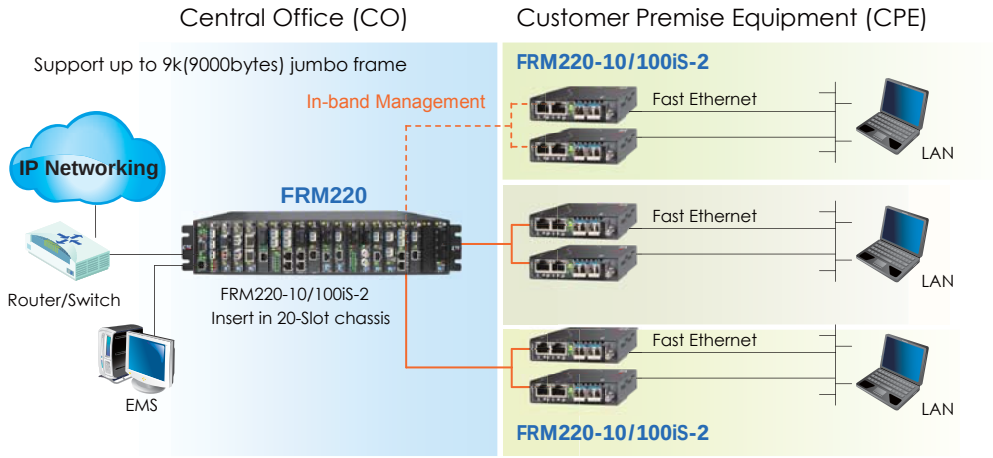
The FRM220-10/100iS-2 is a dual channel (two in one) 10/100Base Ethernet to 100Base-FX fiber slide-in card converter designed for central and remote applications. With advanced features like bandwidth control, this media converter is targeted for customer premises equipment in metro LAN, campus, enterprise and FTTx applications. By offering in-band management, this converter can be completely controlled and monitored from a centrally located managed rack controlling all converter settings including band-width control, duplex, and speed configuration. This media converter is completely transparent to Layer 2 and Layer 3 protocols including IEEE 802.1q, VLAN tag, Q in Q, STP, IPX, IP, etc.

Features

- Dual Converter 10/100Base-TX to 100Base-FX
- Auto-Negotiation or forced mode
- Auto MDI/MDIX
- Forward 2046 bytes (max.) packets in switch mode
- Forward 9K jumbo packets in converter mode
- Supports Q in Q double tagged frame transparent
- Supports IEEE 802.1q Tag VLAN pass thru
- Supports local / remote In-band management (Monitor and Configure) by the SNMP manager.
- Bandwidth control (Nx32K or Nx512Kbps)
- Support flow control (Pause)
- Supports remote CPE power fail detect (dying gasp)
- Supports Far End Fault
- Supports Link Fault Pass through (LFP)
- Supports Loop Back Test
- Supports RMON counter
- D/D function for supported SFP fiber transceiver
- Auto Laser Shutdown (ALS)
- Fiber Hardware Reset (FHR)
- Online local / remote f/w upgrade
- Must be placed in managed chassis to realize any management features

Specifications

Optical Interface	Connector	SFP LC
	Data rate	100Mbps
	Duplex mode	Full duplex
	Fiber	MM 50/125μm, 62.5/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310,1550nm WDM 1310Tx/1550Rx (type A) 1550Tx/1310Rx (type B)
Electrical Interface	Connector	RJ-45
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Cable	10Base-T Cat.3, 4, 5, UTP, 100Base-TX Cat.5, 5e or higher
Standard		IEEE 802.3, IEEE 802.3u,TS-1000
Indications		LED (Power, FEF, FX-Link, TX-SPD, TX-Duplex, TX-Link)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 4W
Dimension / Weight		155 x 88 x 23mm (D x W x H) ; 0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-10/100iS-2	Dual converter 10/100Base-TX to 100Base-FX SFP with In-band management, (optional SFP)

Note: The card is suitable for using in CH01 standalone chassis.

NEW

Fiber Modem Ethernet over E1 Fiber

FRM220-ET100

FRM220-ET100 is a single port Fiber WAN (TDM) card with built-in HDLC Bridge for the FRM220 Series Platform Media Converter Racks. The converter supports Nx64 data rates from 64Kbps up to 2.048Mbps when linked by fiber to FRM220-Data or FRM220-E1/T1 cards. The clock source may be selected internally or recovered from received fiber signal. The Ethernet port utilizes a single RJ-45 connector. When the FRM220-ET100 card is placed in the FRM220 rack with SNMP management, the management can view the converter card's status, type, version, Ethernet link status and alarms. The card can be configured to enable or disable the port, reset the card, set clocking, data rate and provide digital diagnostic loopbacks. A unique feature of the FRM220-ET100 is the use of a common card design which may either be inserted in the FRM220-CH01 single slot chassis as a stand-alone modem or as a card when placed in the FRM220-CH20 In-band managed rack.

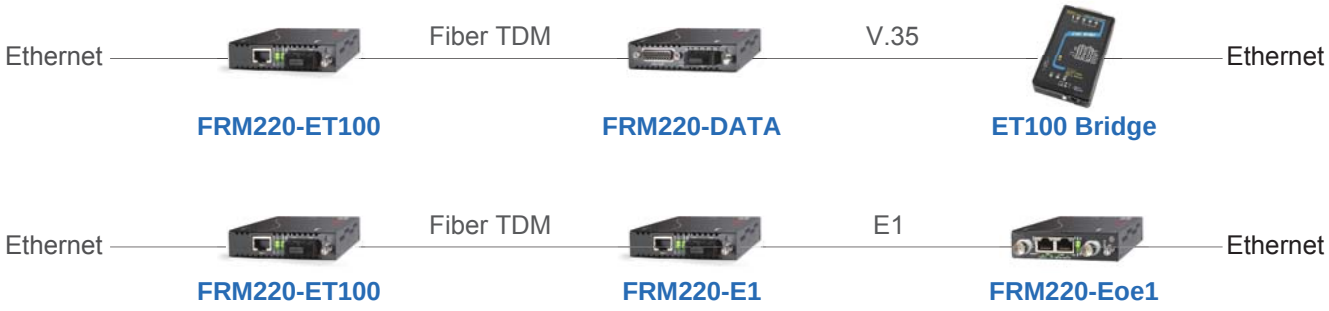
Features

- Standalone type, 1 port Ethernet to HDLC (fiber) converter.
- P2P Fiber link compatible with FRM220-E1/T1 and FRM220-Data
- Interface connectors, RJ-45 for 10/100 Base-Tx.
- Fixed optical for SC or ST, 2km(MM) to 120km(SM)
- TDM settings.
  - Clock source (internal or external).
  - Nx64k data rate (64kbps~2048kbps).
- Ethernet encapsulated with ISO 13239 standard HDLC.
- Loop Back with integral BERT
- LED indicators
- Firmware upgradeable, when placed in managed FRM220 chassis

Specifications

TDM (fiber) Interface	Connector	1x9 (SC, ST, FC)
	Data rate	64~2048kb/s(nx64)
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310, 1550nm, WDM 1310Tx/1550Rx(type A), 1550Tx/1310Rx(type B)
Tests	E1 Loops	Remote Loop back
	BERT	Integral 511 pattern generator
Ethernet Interface	Standard	IEEE 802.3u, IEEE 802.3
	Data rate	10Mbps, 100Mbps
	Duplex mode	Half / Full duplex
	Connector	RJ-45
Indications	PWR, TD/RD Act., Test, Sys, Alarm, Error	
Power Input	Card : 12 VDC	
	Standalone : AC, DC option	
Power Consumption	< 5W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	0.28kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% RH (non-condensing)	
Certifications	CE, FCC, RoHS	
MTBF	75,000 hrs	

Ethernet over Fiber TDM



Ordering Information

Model Name	Description
FRM220-ET100	10/100Base-TX to E1 fiber modem

Note: The card is suitable for using in CH01M standalone chassis.

Connector Type / Connectivity Distance

FRM220 – ET100 – □□□□□

Example: FRM220 – ET100 – SC002

Connector Type	*Connectivity Distance*
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

Fiber Modem V.35 / X.21 / RS-530 / RS-449 / RS-232 over Fiber

FRM220-Data

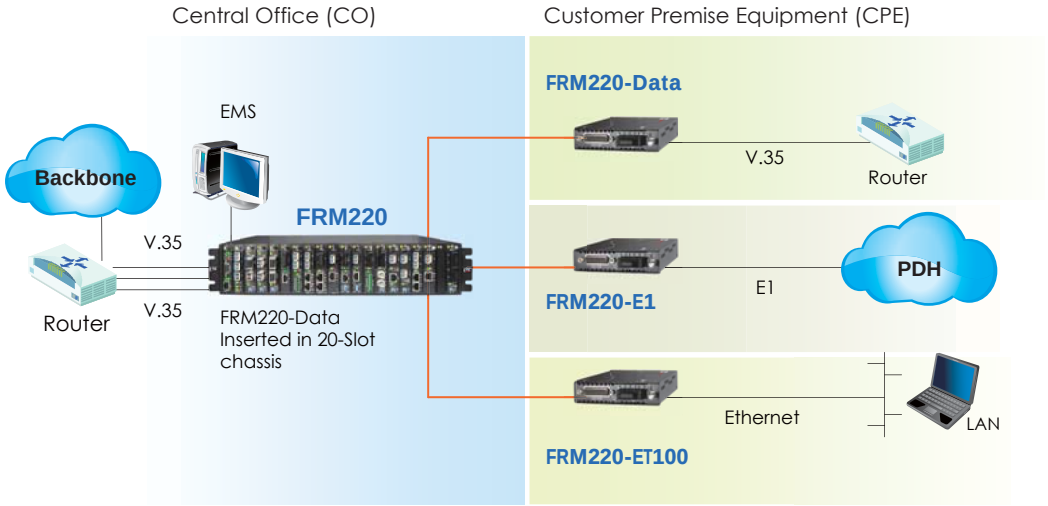
The FRM220-DATA is a media converter for high-speed (up to 8.192Mbps) synchronous or low speed synchronous and asynchronous data transmissions (V.35, RS-232, RS-530, X.21 or RS-449) over fiber optical media. When the FRM220-DATA card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. Both card and remote can be configured to enable or disable the port, reset the port, set the data rate, modify the clock mode, and initiate local or far end loop back tests. The FRM220-Data converter may also be paired with the FRM220-E1/T1 for Nx64K transmissions.

Features

- Synchronous or Asynchronous data over fiber
- In-band network management via terminal, web or SNMP in FRM220 chassis
- Software selectable interface, V.35, X.21, RS-530, RS-449, RS-232 (sync mode)
- Software selectable DCE or DTE mode
- User selectable data rate n x 64kbps, up to 9Mbps
- Independent clock mode setting, (internal, external, or recovery) for transmit and receive
- Electrical and optical loop back tests
- Compatible with FRM220-E1 on same fiber link for N x 64k
- Standalone RS232 console management via CH01M

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	36.864Mbps
	Line coding	Scrambled NRZ
	Bit Error Rate	Less than 10^{-10}
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	1310nm, 1550nm
Electrical Interface	Connector	HDB26F w/ adapter cable for V35, X21, RS530, RS449,RS232
	Line Code	NRZ
	Baud Rate	RS-232 up to 384K async V.35/RS-530 up to 9152k sync where n=1 to 143 (64K ~ 9152KKbps)
	Clock source	Internal, Recovery, External
Standard		ITU-T
Indications		LED (Power, FX Link, RTS, Test , TD, RD, CTS, DCD)
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 5W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220-Data	V.35/X.21/RS-530/RS-449/RS-232 fiber modem

Note: The card is suitable for using in CH01M standalone chassis.

Connector Type / Connectivity Distance

FRM220 – Data – □□□□□

Example: FRM220 – Data – SC002

Connector Type	*Connectivity Distance*
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

Fiber Modem E1/T1 over Fiber

FRM220-E1/T1

The FRM220-E1/T1 is a fiber media transport for G.703 E1/T1 transmissions. The BNC model provides unbalanced 75 Ohm coaxial E1 connections while the RJ-45 model provides switchable balanced 120 Ohm E1 or 100 Ohm T1 connections over twisted pair wiring. When the FRM220-E1/T1 card is placed in the FRM220 rack with in-band management, the card status, type, version, fiber link status, E1 or T1 link status and alarms for both local card and remote unit can all be displayed. Configuration is also available to enable or disable the port, reset the port, do far end fault setting, and initiate local or far end loop-back tests. When set for E1 mode, the FRM220-E1/T1 also supports fractional (structured) E1 when connected to a remote FRM220-Data, synchronous data communications converter. In an E1 transmission network where end connection requires synchronous data communication such as V.35 or RS-530 (X.21, RS-449), these units eliminate the need for an extra CSU/DSU.

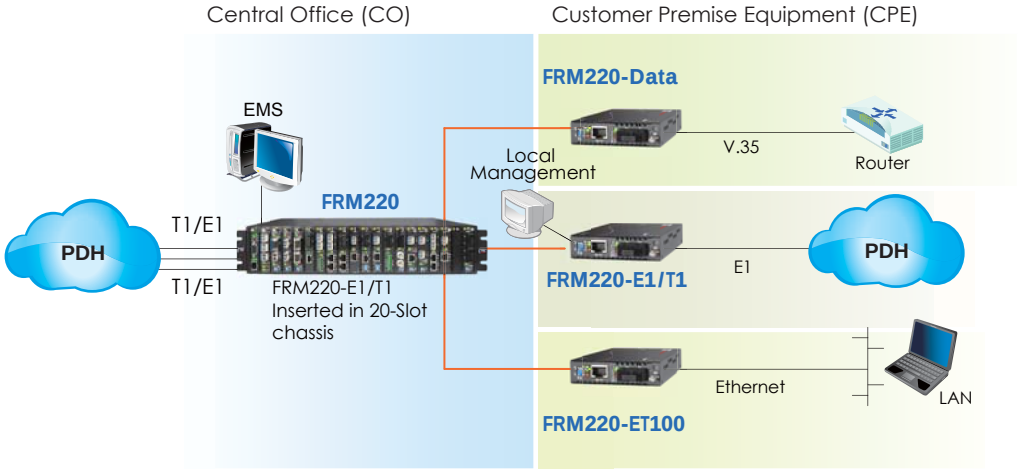
Features

- In-band network Managed via Terminal, web or SNMP in FRM220 chassis
- T1/E1 RJ-45 (USOC RJ-48C) or E1 Coax (BNC) to Fiber converter
- Supports AMI or B8ZS/HDB3 line codes
- T1 supports unframed to FRM220-Data
- E1 supports unframed or fractional (N x 64k) to FRM220-Data
- User selectable E1 or T1 setting
- Electrical and optical Loop back tests
- Standalone RS232 console management via CH01M

Specifications

Optical Interface	Connector : 1x9 (SC, ST, FC)
	Data rate : 36.864Mbps
	Line coding : Scrambled NRZ
	Bit Error Rate : Less than 10^{-10}
	Distance : MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength : 1310nm, 1550nm
Electrical Interface	Connector : RJ45 E1-120Ω, T1-100 Ω, BNC E1-75 Ω
	Data rate: E1: 2.048Mpbs, T1:1.544Mbps
	Line Code: E1 HDB3/AMI, T1: B8ZS/AMI
	Cable type
	Cat.3 or higher Twisted-Pair cable
Standard	E1 ITU-T G.703, G.704, G.706, G.732, G.823
	T1 ITU-T G.703, G.704, AT&T, TR-62411, ANSI T1.403
Indications	Power, FX-Link, E1/T1 SIG, Test, SYN, RD, TD, AIS
	(E1/T1R) Power, FX-Link, E1 SIG, Test(E1B)
Power Input	Card : 12VDC
	Standalone : AC, DC options
Power Consumption	< 5W
Dimensions	155 x 88 x 23mm (D x W x H)
Weight	0.12kg
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

In-band Managed PDH Fiber Modem



Ordering Information

Model Name	Description
FRM220-E1/T1R	RJ-45 fiber modem
FRM220-E1B	BNC fiber modem

Note: The card is suitable for using in CH01M standalone chassis.

Connector Type / Connectivity Distance

FRM220 – □□/□□□–□□□□□

Example: FRM220 – E1/T1R – SC002

Connector Type	*Connectivity Distance*
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

RS-485 / 232 over Fiber

FRM220-Serial

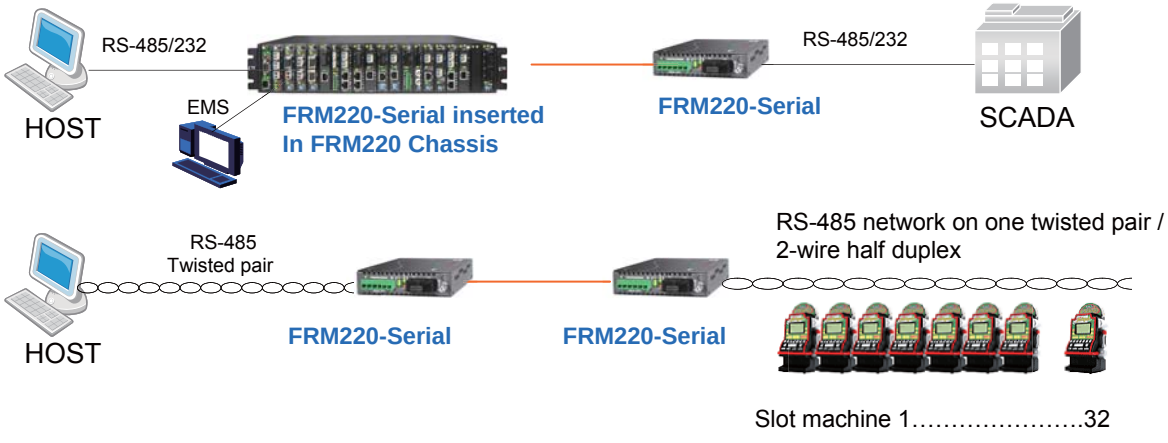
The FRM220-Serial provides a fiber converter solution to extend asynchronous RS-485 or RS-232 transmission distance up to 2km over multimode fiber or up to 120km over single mode fiber. The converter is equipped with multiple interface circuits for connection to RS-232 or RS485 (2 or 4 wire, full or half duplex). The FRM220-Serial secures data transmission over EMI resistant fiber at speeds up to 460kbps for RS-232 or up to 1024kbps for RS485. When the FRM220-Serial/485 card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, data link status and alarms. Both card and remote can be configured to enable or disable the port, reset the port and set the interface type.

Specifications

Optical Interface	Connector	1x9 (SC, ST, FC)
	Data rate	36.864Mbps
	Line coding	Scrambled NRZ
	Bit Error Rate	Less than 10^{-10}
	Fiber	MM 62.2/125μm, 50/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310, 1550nm, WDM 1310Tx/1550Rx(type A) 1550Tx/1310Rx(type B)
Electrical Interface	Connector	6 pins Terminal block
	Data Signal Formats	RS-485 2-wire RS-232 RTS/CTS 5-wire RS-232 3-wire
	Baud Rate	RS-422, RS-485 up to 1024kbps RS-232 up to 256kbps
	Bit Error Rate	Less than 10^{-10}
Standard		EIA/TIA RS-485, RS-232
LEDs		Power, FX Link, DI, DO, Test
Power Input		Card : 12VDC Standalone : AC, DC options
Power Consumption		< 5W
Dimensions		155 x 88 x 23mm (D x W x H)
Weight		0.12kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% non-condensing
Certification		CE, FCC, LVD, RoHS
MTBF		65,000 hrs

Features

- Extend asynchronous serial transmission from 2km to 120km over fiber
- In-band network management via terminal, web or SNMP in FRM220-CH20 chassis
- Software selectable data interface for RS-232/ 485
- Software selectable two wires (half duplex) or four wires (full duplex) RS-485
- Software selectable three or five wires RS-232
- Speeds up to 256kbps for RS-232 (Async. mode)
- Speeds up to 1Mbps for RS-485
- Standalone RS232 console management via CH01M



Ordering Information

Model Name	Description
FRM220-Serial	RS-485/ 232 fiber converter

Note: The card is suitable for using in CH01M standalone chassis.

Connector Type / Connectivity Distance

FRM220 – Serial – □□□□□

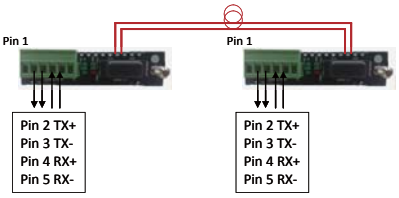
Example: FRM220 – Serial – SC002

Connector Type	*Connectivity Distance*
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

RS-485 Termination is used to match impedance of a node to the impedance of the transmission line being used. When impedances are mismatched, the transmitted signal is not completely absorbed by the load and a portion is reflected back into the transmission line. This reflection may cause errors in the data. Termination resistors should be placed only at the extreme ends of the data line, and no more than two terminations should be placed in any system.

RS-485 4 wires (Full duplex)

* For RS-485 4 wires operation, TX+. TX- , RX+ and RX- are connected



Pin	Signal Connection
1	NC
2	RS-485 Out +
3	RS-485 Out -
4	RS-485 In+
5	RS-485 In-
6	NC

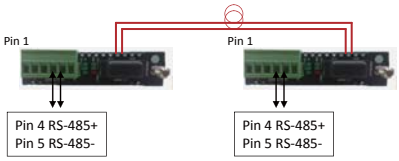
* For RS-485 4 wires Dip Switch Setting

Pin	Function description	Dip Switch Setting
1	Interface Setting	Off
2	Interface Setting	Off
3	RS-485 TX Termination	On
4	RS-485 RX Termination	On
5	1K Ohm Pull-up	Off
6	1K Ohm Pull-Down	Off

*On enable RX(-) pull down **On enables RX(+) pull down

RS-485 2 wires (Half duplex)

* For RS-485 2 wires operation, RS-485(+) and RS-485 (-) are connected



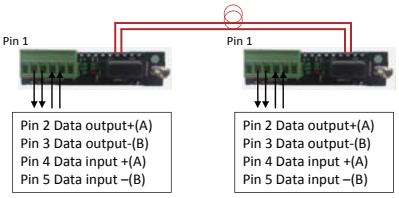
Pin	Signal Connection
1	NC
2	NC
3	NC
4	RS-485 (+)
5	RS-485 (-)
6	NC

* For RS-485 2 wires Dip Switch Setting

Pin	Function description	Dip Switch Setting
1	Interface Setting	On
2	Interface Setting	Off
3	RS-485 TX Termination	Off
4	RS-485 RX Termination	On
5	1K Ohm Pull-up	Off
6	1K Ohm Pull-Down	Off

RS-422 4 wires

* For RS-422 4 wires operation, TD+(A), TD-(B), RD+(A) and RD-(B) are connected


Pin 1
Pin 1
Pin 2 Data output+(A)
Pin 3 Data output-(B)
Pin 4 Data input +(A)
Pin 5 Data input –(B)
Pin 2 Data output+(A)
Pin 3 Data output-(B)
Pin 4 Data input +(A)
Pin 5 Data input –(B)

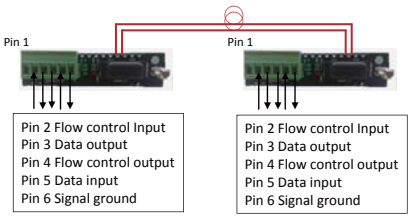
Pin	Signal Connection
1	NC
2	RS-422 Out+ (A)
3	RS-422 Out– (B)
4	RS-422 In+ (A)
5	RS-422 In- (B)
6	Signal Ground

* For RS-422 4 wires Dip Switch Setting

Pin	Function description	Dip Switch Setting
1	Interface Setting	Off
2	Interface Setting	Off
3	RS-485 TX Termination	Off
4	RS-485 RX Termination	Off
5	1K Ohm Pull-up	Off
6	1K Ohm Pull-Down	Off

RS-232 5 wires

* For RS-232 5 wires operation, TD, RD, and SG are connected, plus 1 handshaking pair


Pin 1
Pin 1
Pin 2 Flow control Input
Pin 3 Data output
Pin 4 Flow control output
Pin 5 Data input
Pin 6 Signal ground
Pin 2 Flow control Input
Pin 3 Data output
Pin 4 Flow control output
Pin 5 Data input
Pin 6 Signal ground

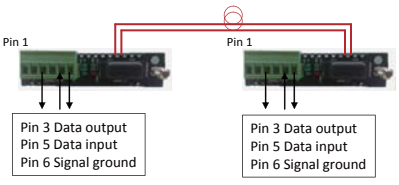
Pin	Signal Connection
1	NC
2	RS-232 RTS/CTS In
3	RS-232, Data out
4	RS-232 RTS/CTS Out
5	RS-232 Data in
6	Signal Ground

* For RS-232 5 wires Dip Switch Setting

Pin	Function description	Dip Switch Setting
1	Interface Setting	Off
2	Interface Setting	On
3	RS-485 TX Termination	Off
4	RS-485 RX Termination	Off
5	1K Ohm Pull-up	Off
6	1K Ohm Pull-Down	Off

RS-232 3 wires

* For RS-232 3 wires operation, only TD, RD, and SG are connected



Pin	Signal Connection
1	NC
2	NC
3	RS-232, Data out
4	NC
5	RS-232 Data in
6	Signal Ground

* For RS-232 3 wires Dip Switch Setting

Pin	Function description	Dip Switch Setting
1	Interface Setting	On
2	Interface Setting	On
3	RS-485 TX Termination	Off
4	RS-485 RX Termination	Off
5	1K Ohm Pull-up	Off
6	1K Ohm Pull-Down	Off

FXO / FXS 2-wire Fiber Converter

FRM220-FXO/FXS

FRM220-FXO/FXS POTS phone line converter extender is used to connect PSTN voice signals to distant Plain Old Telephone (POTS) devices. FRM220-FXO/FXS provides a fiber media transport for POTS transmission and features an RJ-11C for copper connection. A pair of FRM220-FXO/FXS is required to implement an end to end system. FXO mode connects to a telephone line or PBX and has ability to detect ringing voltages and to act as a telephone. FXS mode is the reciprocal unit and has ability to act as PSTN and connects to a telephone device. When the FRM220-FXO/FXS card is placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, fiber link status, on hook status and alarms. Both card and remote can be configured to enable or disable the port, reset the port and set the FXO or FXS mode.

Features

- Extend telephone voice transmission from 2km to 120km over fiber
- Network management via terminal, web or SNMP in FRM220 chassis
- Supports telephone voice transmission
- Supports caller ID pass through
- Selectable FXO or FXS mode
- Supports FXS to FXS hot line

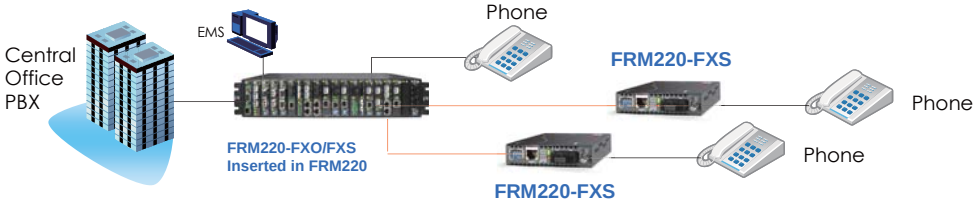
Specifications

Optical Interface	Connector	1x9 (SC)
	Fiber	MM 62.2/125μm, 50/125μm. SM 9/125μm
	Distance	MM 2km, SM 15/30/50/80/120km, WDM 20/40/60/80km
	Wavelength	MM 1310nm, SM 1310, 1550nm, WDM 1310Tx/1550Rx(type A), 1550Tx/1310Rx(type B)
Electrical Interface	Connector	RJ-11
	FXO mode	Impedance : 600 ohms Coding : 16 bits liner Loop Current : 10~100mA Ring Frequency : Acceptable 20 ~50Hz Insertion Loss: 0.0 ± 1.0dB at 1000Hz
	FXS mode	Impedance : 600 ohms Coding : 16 bits liner Dial: DTMF and Dial Pulse Battery Source: 48VDC ± 4V Ringing Waveform : Sine wave Ringing Frequency : 20/25/30/35/40/45/50 Hz selectable Ring Cadence: FXS to FXS : On / 1 sec, Off / 2 sec FXO to FXS; Reproduces the cadence detected by FXO Insertion Loss 0.0 ± 1.0dB at 1000Hz REN: 4.0B(Ring Equivalence Number)
Indications	LED (Power, FX Link, Phone Act, Test)	
Power Input	Card : 12VDC Standalone : AC, DC options	
Power Consumption	< 5W	
Dimensions	155 x 88 x 23mm (D x W x H)	
Weight	0.12kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, LVD, RoHS	
MTBF	65,000 hrs	

Automatic Ring down hotline

Voice transmission from 2km to 120km over fiber

Selectable FXO or FXS mode



Ordering Information

Model Name	Description
FRM220-FXO/FXS	FXO/FXS fiber converter

Note: The card is suitable for using in CH01 standalone chassis.

Connector Type / Connectivity Distance

FRM220 – FXO/FXS – □□□□□

Example: FRM220 – FXO/FXS – SC002

Connector Type	*Connectivity Distance*
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

Ethernet Bridge over E1

FRM220A-Eoe1

The FRM220A-Eoe1 is a slide-in card E1 Ethernet Bridge capable of providing 1x E1 lines for cost-effective connection of 10/100BaseTX or 100Base-FX LANs over E1 transports. The FRM220A-Eoe1 transmits up to a 2.048Mbps Ethernet bridge channel (HDLC encapsulated) over E1 links. The FRM220A-Eoe1 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-Eoe1 fully meets E1 specifications including ITU-T G.704 and G.823. The FRM220A-Eoe1 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-Eoe1 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

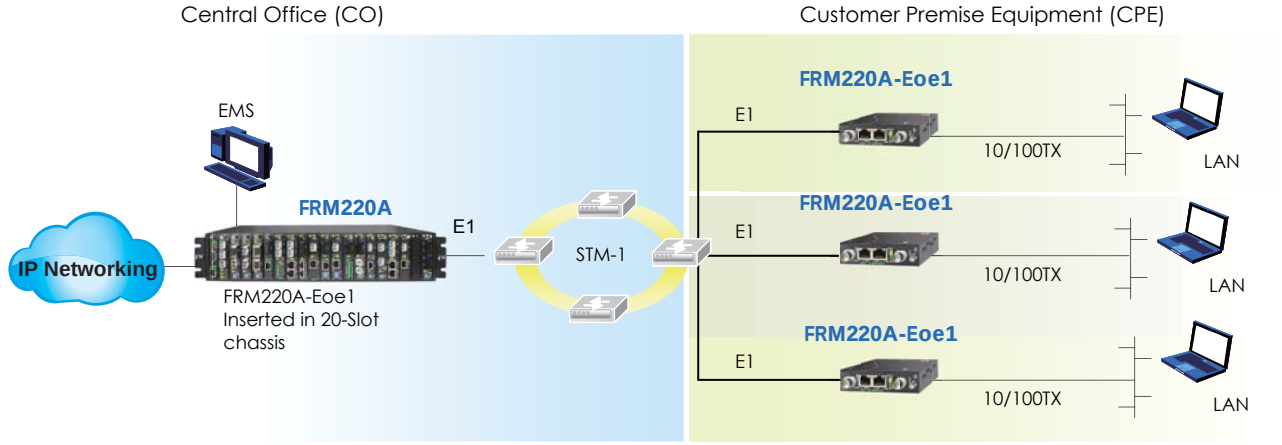
- Connects one Fast Ethernet over E1 links (64k~2048Kbps)
- Built-in HDLC bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A and FRM220 chassis
- SNMP management with FRM220A and FRM220 chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

Interface	Framing	framed / unframed
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
	Connector	RJ45 10/100Base-TX
Indications		Power, ALM,E1 signal loss , E1 Alarm（AIS，LOF， RAI, LOMF), LAN link /ACT, 10/100M , SD(100Base-FX)
Power Input		AC adapter : 100~240VAC to 12VDC AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions	DC12	: 160 x 88 x 24mm (D x W x H)
	AC/DC48/AD	: 201 x 135 x 35mm (D x W x H)
Weight		DC 12 : 0.28kg, AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs

Managed E1 Bridge

Delivering point-to-point Fast Ethernet service across E1 circuits



Ordering Information

Model Name	Description
FRM220A-Eoe1	10/100Base-TX to E1 HDLC bridge operates at WAN

Note: The card is suitable for using in CH01M standalone chassis.

NEW

Ethernet Bridge over E1 (GFP)

FRM220A-Eoe1/G

The FRM220A-Eoe1/G is a slide-in card E1 Ethernet Bridge capable of providing 1x E1 lines for cost-effective connection of 10/100BaseTX or 100Base-FX LANs over E1 transports. The FRM220A-Eoe1/G transmits up to a 1.984Mbps Ethernet bridge channel (Generic Framing Procedure Encapsulated) over E1 links. The FRM220A-Eoe1/G supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-Eoe1/G fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-Eoe1/G features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-Eoe1/G and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

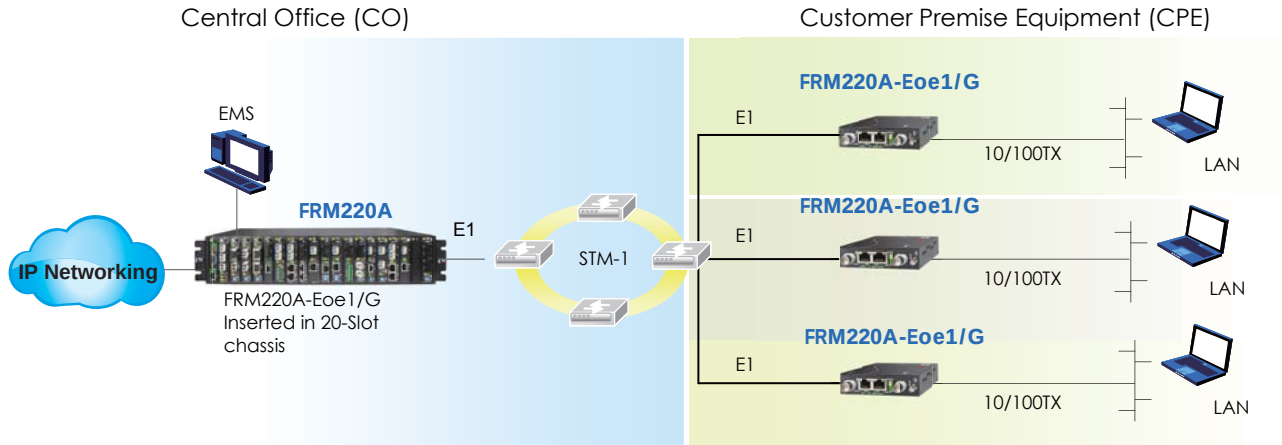
- Connects one Fast Ethernet over E1 links (1.984Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A and FRM220 chassis
- SNMP management with FRM220A and FRM220 chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

Interface	Framing	Framed / Unframed
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex Encapsulation GFP (G.7041)
	Connector	RJ45 10/100Base-TX
Indications		Power, ALM,E1 signal loss , E1 Alarm（AIS，LOF， RAI, LOMF), LAN link /ACT, 10/100M , SD(100Base-FX)
Power Input		AC adapter : 100~240VAC to 12VDC AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 6W
Dimensions	DC12	: 160 x 88 x 24mm (D x W x H)
	AC/DC48/AD	: 201 x 135 x 35mm (D x W x H)
Weight		DC 12 : 0.28kg, AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs

Managed E1 Bridge

Delivering point-to-point Fast Ethernet service across E1 circuits



Ordering Information

Model Name	Description
FRM220A-Eoe1/G	10/100Base-TX to E1 GFP bridge operates at WAN

Note: The card is suitable for using in CH01M standalone chassis.

5E1 Inverse Multiplexer

FRM220A-iMux5

The FRM220A-iMux5 is an E1 inverse multiplexer capable of bundling up to 5 E1 lines for cost-effective connection of 10/100BaseTX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux5 inverse multiplexer transmits up to a 9.92Mbps Ethernet bridge channel (GFP-F encapsulated) over 5 E1 links. The FRM220A-iMux5 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux5 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMux5 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux5 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux5 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

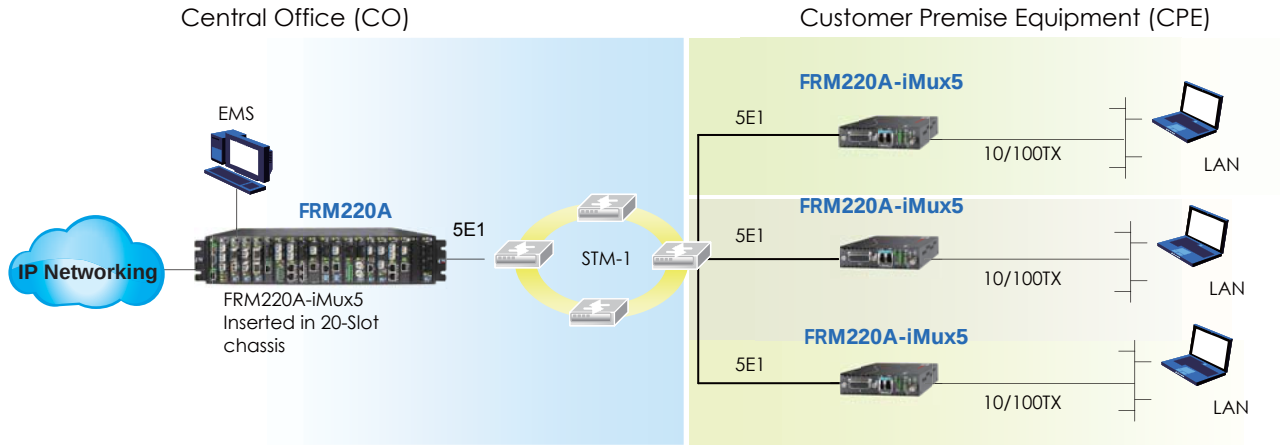
- Connects one Fast Ethernet over E1 links (1.984Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 5E1)
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex 100Base-FX
	Connector	RJ45 10/100Base-TX SFP-LC 100Base-FX
Indications		Power, ALM,E1 signal loss , E1 Alarm (AIS ، LOF ، RAI, LOMF), LAN link /ACT, 10/100M , SD(100Base-FX)
Power Input		AC adapter : 100~240VAC to 12VDC AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 6W
Dimensions	DC12	: 160 x 88 x 24 (D x W x H)mm
	AC/DC48/AD	: 201 x 135 x 35 (D x W x H)mm
Weight		DC 12 : 0.28kg , AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		75,000 hrs

Managed E1 Bridge

Delivering point-to-point Fast Ethernet service across E1 circuits



Ordering Information

Model Name	Description
FRM220A-iMux5T-R	10/100Base-TX to 5E1 mux card with 5E1 RJ45 cable
FRM220A-iMux5T-B	10/100Base-TX to 5E1 mux card with 5E1 BNC cable

Note: The card is suitable for using in CH01M standalone chassis.

FRM220A – iMux5T – ☐

Example: FRM220A – iMux5T – R

8E1 Inverse Multiplexer

FRM220A-iMux8

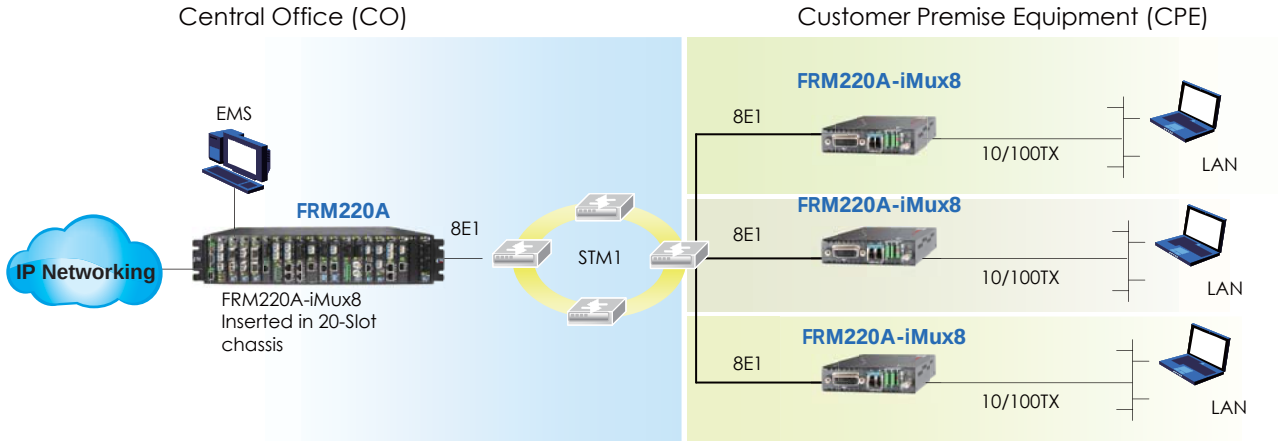
The FRM220A-iMux8 is an E1 inverse multiplexer capable of bundling up to 8 E1 lines for cost-effective connection of 10/100BaseTX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux8 inverse multiplexer transmits up to a 15.87Mbps Ethernet bridge channel (GFP-F encapsulated) over 8 E1 links. The FRM220A-iMux8 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux8 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMux8 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux8 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux8 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

- Connects one Fast Ethernet over 8E1 links (1.984Mbps to 15.87Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Maximum 220ms delay variance between E1 link
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 8E1)
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	BNC / RJ45
	Diagnostics	Digital remote loopback
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex
	Connector	RJ45 10/100Base-TX
		SFP-LC 100Base-FX
Indications		Power, ALM,E1 signal loss ,
		E1 Alarm(AIS，LOF， RAI, LOMF),
		LAN link /ACT, 10/100M , SD(100Base-FX)
Power Input		AC adapter : 100~240VAC to 12VDC
		AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions	DC12	: 160 x 88 x 24mm (D x W x H)
	AC/DC48/AD	: 201 x 135 x 35mm (D x W x H)
Weight		DC 12 : 0.28kg, AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220A-iMux8T-R	10/100Base-TX to 8E1 mux card with 8E1 RJ45 cable
FRM220A-iMux8T-B	10/100Base-TX to 8E1 mux card with 8E1 BNC cable

Note: The card is suitable for using in CH01M standalone chassis.

FRM220A – iMux8T – ☐
Example: FRM220A – iMux8T – R

16E1 Inverse Multiplexer

FRM220A-iMux16

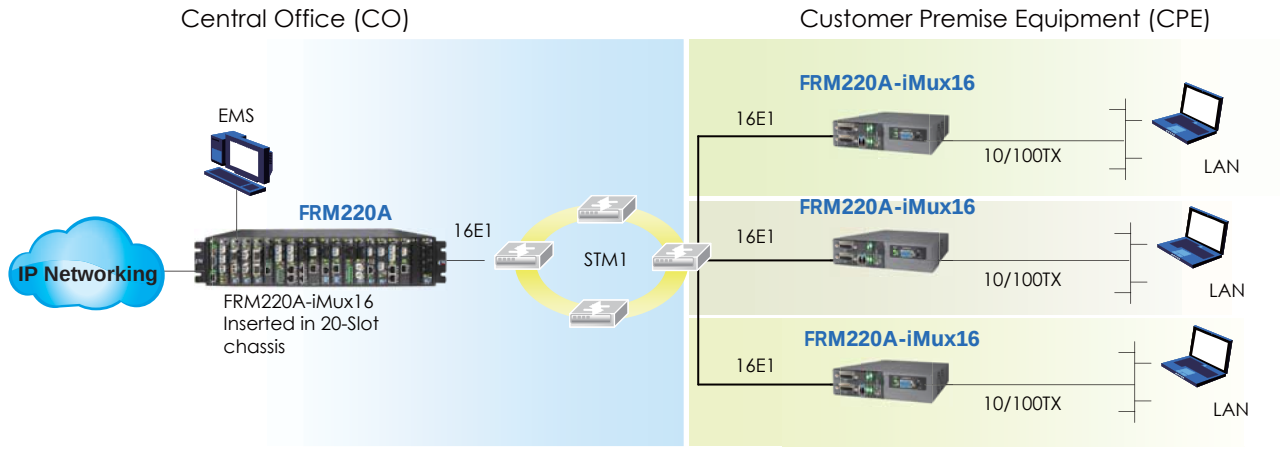
The FRM220A-iMux16 is an E1 inverse multiplexer capable of bundling up to 16 E1 lines for cost-effective connection of 10/100BaseTX or 100Base-FX LANs over multiple E1 transports. The FRM220A-iMux16 inverse multiplexer transmits up to a 31.74Mbps Ethernet bridge channel (GFP-F encapsulated) over 16 E1 links. The FRM220A-iMux16 bridges the gap between E1 and E3, allowing bridges to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access services available are E1 lines. The FRM220A-iMux16 supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220A-iMux16 fully meets E1 specifications including ITU-T G.703 and G.823. The FRM220A-iMux16 features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the FRM220A-iMux16 and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

- Connects one Fast Ethernet over 16E1 links (1.984Mbps to 31.74Mbps)
- Built-in GFP bridge operates at WAN rate
- Auto-Negotiation
- Maximum 220ms delay variance between E1 link
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220A chassis
- SNMP management with FRM220A chassis
- LED Alarm indication
- Standalone RS232 console management via CH02M

Specifications

Interface	Framing	CCS+CRC
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm (up to 16E1)
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	220ms
	Connector	RJ45, BNC
	Diagnostics	Digital remote loopback
	Standard	IEEE 802.3, 802.3u
	Data rate	10/100Base-TX, Half/Full duplex 100Base-FX
	Connector	RJ45 10/100Base-TX SFP-LC 100Base-FX
Indications		Power, ALM,E1 signal loss , E1 Alarm（AIS，LOF， RAI, LOMF), LAN link /ACT, 10/100M , SD(100Base-FX)
Power Input		AC adapter : 100~240VAC to 12VDC AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions		DC12 : 160 x 88 x 24 (D x W x H)mm AC/DC48/AD : 201 x 135 x 35 (D x W x H)mm
Weight		DC 12 : 0.28kg , AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220A-iMux16T-R	10/100Base-TX to 16E1 mux card with 2x 8E1 RJ45 cables
FRM220A-iMux16T-B	10/100Base-TX to 16E1 mux card with 2x 8E1 BNC cables

Note: The card is suitable for using in CH02M standalone chassis.

FRM220A – iMux16T – ☐
Example: FRM220A – iMux16T – R

Data to Fractional E1

FRM220-E1/Data

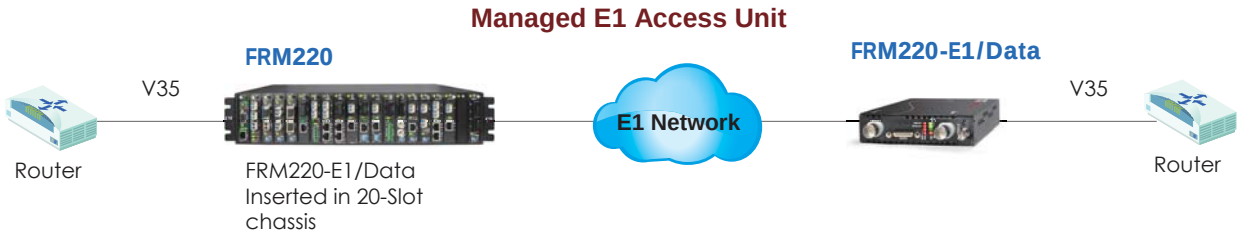
The FRM220-E1/DATA slide in card DSU/CSU is a digital access unit for Unframed or Fractional E1 services. The FRM220-E1/DATA data channel supports user-selectable transmission rates via selected E1 timeslots, which provides integral multiples of 64kbps or 56kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The FRM220-E1/DATA front panel provides status LEDs for monitoring the CSU and DSU conditions for initiating local and remote loopback with integral BERT. The FRM220-E1/DATA features a Data cable adapter for connection to industry standard routers. When the FRM220-E1/DATA card is Placed in the FRM220 rack with SNMP management, in-band management allows viewing the card and remote converter's status, type, version, link status, data link status and alarms. Both card and remote can be configured to enable or disable the port, reset the port, set the data rate, modify the clock mode and initiate local or far end loop back test.

Features

- Supports Fractional E1 and Unframed E1 services with V.35/X21/RS530 adapter cable
- I/O connectors all located on front panel
- Multiple clock source selection and remote loopback (Internal or External: E1 recovery, DTE or DCE)
- Unbalanced E1/BNC or balanced E1/RJ45
- Fully compatible with FRM220-CH20 and FRM220A chassis
- SNMP management with FRM220-CH20 chassis
- LED Alarm indication
- Standalone RS232 console management via CH01M

Specifications

E1 Interface	Framing	Framed/Unframed
	Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
	Bit rate	2.048Mbps± 50ppm
	Line code	HDB3
	Clock setting	Internal OSC or recovery clock
	Receive level	-43dB
	Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
	Jitter Performance	Complies with ITU-T G.823
	Pulse Mask	Complies with ITU-T G.703
	Pulse amplitude	Nominal 2.37V ± 10%
	Delay Variance	8ms
	Connector	BNC / RJ45
	Diagnostics	Digital remote loopback
Ethernet Interface	Standard	ITU-T
	Data rate	Nx56 / Nx64
	Connector	HDB26F w/ adapter cable for Data
LEDs		Power, TD, RD, RTS, DCD, TX Clock loss, Signal loss, Sync loss, Alarm, test error
Power		AC adapter : 100~240VAC to 12VDC AC 100 ~ 240V, DC -18 ~ 75V
Power Consumption		< 12W
Dimensions	DC12	: 160 x 88 x 24mm (D x W x H)
	AC/DC48/AD	: 201 x 135 x 35mm (D x W x H)
Weight		DC 12 : 0.28kg, AC/DC48/AD : 0.58kg
Temperature		0 ~ 60°C (Operating), -10 ~ 70 °C (Storage)
Humidity		10 ~ 90% RH (non-condensing)
Certifications		CE, FCC, RoHS
MTBF		65,000 hrs



Ordering Information

Model Name	Description
FRM220- E1/V35-R	10/100Base-TX to 16E1 mux card with 2x 8E1 RJ45 cables
FRM220- E1/V35-B	10/100Base-TX to 16E1 mux card with 2x 8E1 BNC cables
FRM220- E1/X21-R	X21 to framed E1 RJ-45 with X21 cable
FRM220- E1/X21-B	X21 to framed E1 BNC with X21 cable
FRM220- E1/RS530-R	RS530 to framed E1 RJ-45 with RS530 cable
FRM220- E1/RS530-B	RS530 to framed E1 BNC with RS530 cable
FRM220- E1/RS449-R	RS449 to framed E1 RJ-45 with RS449 cable
FRM220- E1/RS449-B	RS449 to framed E1 BNC with RS449 cable
FRM220- E1/RS232-R	RS232 to framed E1 RJ-45 with RS232 cable
FRM220- E1/RS232-B	RS232 to framed E1 BNC with RS232 cable

Note: The card is suitable for using in CH01M standalone chassis.

FRM220 – □□/□□□-□

Example: FRM220 – E1/V35-R

E1/T1 Cross Rate Converter

FRM220-FTEC

The FRM220-FTEC is a slide-in card T1 (US Standard), E1 (European Standard) converter and timeslot cross connect which enables conversion between one T1 signal and one E1 signal. T1 and E1 signals with frames employ u-Law and A-Law compander encoding principles respectively and encode those analog signals into 64kbits digital data. The E1 interface supports CCS (PCM31) or CAS (PCM30) frames with or without CRC-4 and with HDB3 line coding. The T1 interface supports D4 or ESF frame formats with B8ZS or AMI line code. Multiple clock source selection provides maximum flexibility in connecting both T1 and E1. The clock source may be from the T1 recovery clock, from the E1 recovery clock, from the internal oscillator, from an external clock or via transparent timing. All setup controls can be performed via FRM220 CH01M RS-232 console port and ASCII terminal. Tests and diagnostics can easily be performed. Diagnostics include T1 local/remote and E1 local/remote loop back.

When FRM220-FTEC card in placed in the FRM220 chassis, SNMP management allows veiwing the card converter's status, type, link status, data link status and alarms.

Features

- Converts between T1 and E1 data and signaling
- Enable equipment to operate at T1 and E1 rates
- Support G.802 Annex B (T1 over E1)
- Configures A-law/μ-law and signaling conversion
- Transparent conversion at 64kbps timeslot level
- Controlled slip for buffer over or under flow
- 24 timeslots of T1 Nx64 can be inserted into E1 Nx64, 30/CAS or 31/CCS timeslots

Specifications

E1 interface	Framing	CAS/PCM30 or CCS/PCM31 selectable
	Bit rate	2.048Mbps
	Line Code	HDB3
	Line Impedance	75 ohm (BNC) / 120 ohm (RJ-45)
		Voice channel sample rule A-Law
	CRC check	CRC-4 enable/disable
	Pulse amplitude	Nominal 2.37V ±10% for 75ohm,
		Nominal 3.00V ±10% for 120ohm
	Zero amplitude	± 0.1V
	Connector	RJ-45 and BNC pair
T1 interface		
	Framing	D4, ESF selectable
	Bit rate	1.544Mbps
	Line Code	B8ZS / AMI
	Equalization	0 ~ 655 feet settable
		Voice channel sample rule μ-Law
	CRC check	CRC-6 when ESF
	Line Impedance	100 ohms
	Transmit Pulse level	3.0V ±10%,
	Receive signal level	0 ~ -10dB
	Connecto	RJ-45 and Bantam Jacks
LEDs	PWR, Sys, Test, T1/E1	
Standard	ITU-T G.703, G.704, G.706, G.823, G.824, ANSI T1.403	
Power	Card: 12VDC	
	Standalone: AC, DC Option	
Power Consumption	< 5W	
Dimensions	160 x 88 x 24mm(D x W x H)	
Weight	0.28kg	
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
Humidity	10 ~ 90% non-condensing	
Certification	CE, FCC, RoHS	
MTBF	57,000 hrs	

Ordering Information

Model Name	Description
FRM220-FTEC	E1/T1 Cross rate converter

Note: The card is suitable for using in CH01 standalone chassis.

E1/ T1+100M Ethernet Fiber Multiplexer

FRM220-FOM01

FRM220-FOM01 is a modular design for E1/T1 + Fast Ethernet multi-service to fiber PDH multiplexer.
FRM220-FOM01 provides E1/T1 transmission transparently, pure 100Mbps Fast Ethernet simultaneously. The fiber optic line gives you the options to choose from most popular fiber cabling connectors such as, ST, SC, FC or SFP-LC.
Both multi-mode and single mode models are available as well as BiDi which allows bi-directional transmissions using only a single fiber cable, With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis.

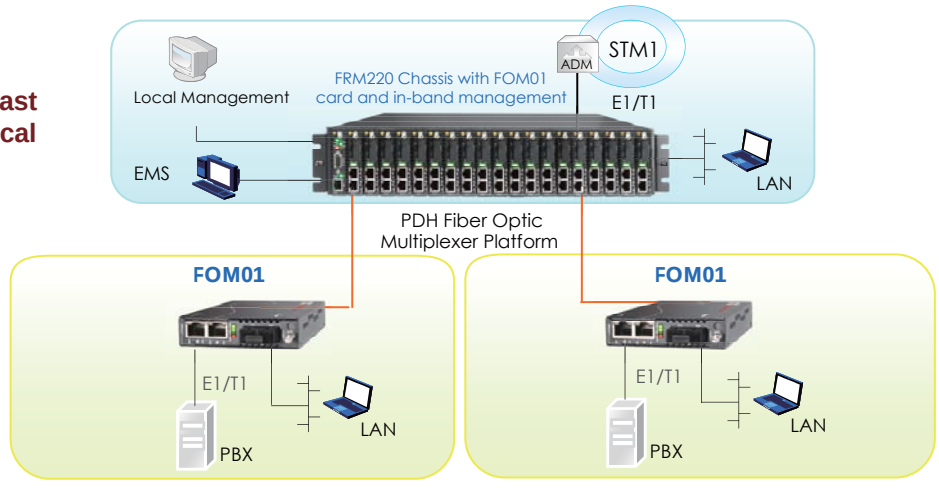
Features

- 1 channel unframed E1/T1
- 10/100Base-TX Ethernet (100M wirespeed)
- Auto MDI/MDIX
- Auto-Negotiation or Force mode
- Supports flow control
- Supports 9K jumbo packets
- Supports Link fault pass through for Ethernet
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- Loopback test on E1/T1, fiber ports
- Supports Dying Gasp
- Supports local or remote In-band management by SNMP manager
- Local management by console port via FRM220-CH01M chassis.
- Supports On-Line F/W upgrade.

Specifications

E1/T1 ports	
Framing	Unframed (transparent)
Bit Rate	E1:2.048 Mb/s , T1: 1.544Mb/s
Line Code	E1:AMI/HDB3, T1: AMI/B8ZS
Line Impedance	E1: Unbalanced 75 ohms (BNC cable) E1: Balanced 120 ohms (RJ-45) T1: Balanced 100 ohms (RJ-45)
Receiver sensitivity	Short haul
"Pulse" Amplitude	Nominal 2.37V+/-10% for 75 ohms Nominal 3.00V+/-10% for 120 ohms
"Zero" Amplitude	+/-0.3V
Transmit Frequency Tracking	w/external clock card option
Internal Timing	+/-30 ppm
Jitter Performance	According to ITU-T G.823
Performance monitoring	According to ITU-T G.821
Standard	ITU-T G.703, G.704, G.706 and G.732
Interface Connectors	RJ-45, BNC
Test Loops	LLB(Local Loop Back), RLB(Remote Loop Back)
Ethernet	
Interface Type	10/100Base-TX
Connector	RJ-45
Standard	IEEE 802.3, 802.3u
Duplex modes	full/half
Indications	Power FX Link, E1/T1 Mode/Link/Loopback test, LAN Link/Speed.
Power Input	AC adapter, 12VDC
Dimensions	155 x 88 x 23mm(D x W x H)
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% RH (non-condensing)
Certifications	CE, FCC, RoHS

Managed E1/T1 + Fast Ethernet Fiber Optical Multiplexer



Ordering Information

Model Name	Description
FRM220-FOM01-SR	E1/T1 RJ-45 and 100Mbps Ethernet Fiber Optic Multiplexer(optional SFP module)
FRM220-FOM01-SB	E1 BNC and 100Mbps Ethernet Fiber Optic Multiplexer(optional SFP module)

Note: The card is suitable for using in CH01M standalone chassis.

Connector Type / Connectivity Distance

FRM220 – FOM01 – □□ – □□□□□

Example: FRM220 – FOM01 – SR – SC002

Connector Type	Connectivity Distance
SC, ST, FC	002: 2km 015: 15km 030: 30km 050: 50km 080: 80km 120:120km 20A: WDM 20km A type 20B: WDM 20km B type 40A: WDM 40km A type 40B: WDM 40km B type 60A: WDM 60km A type 60B: WDM 60km B type 80A: WDM 80km A type 80B: WDM 80km B type

4-port E1/T1+100M Ethernet Fiber Multiplexer

FRM220-FOM04

FRM220-FOM04 is a modular design for 4xE1/T1 + Fast Ethernet multi-service to dual strand fiber PDH multiplexer. FRM220-FOM04 provides E1/T1 transmission transparently, pure 100Mbps Fast Ethernet simultaneously. The fiber optic line is based on the SFP technology that allows a flexible use of Multimode or Single mode lines and enable the support of different wavelengths and distances. The use of bi-directional SFPs maximizes the utilization of the fiber optic line and results in saving line costs. With SNMP and Web-based management in the FRM220, the Network administrator can monitor, configure and control the activity of each card in the chassis.

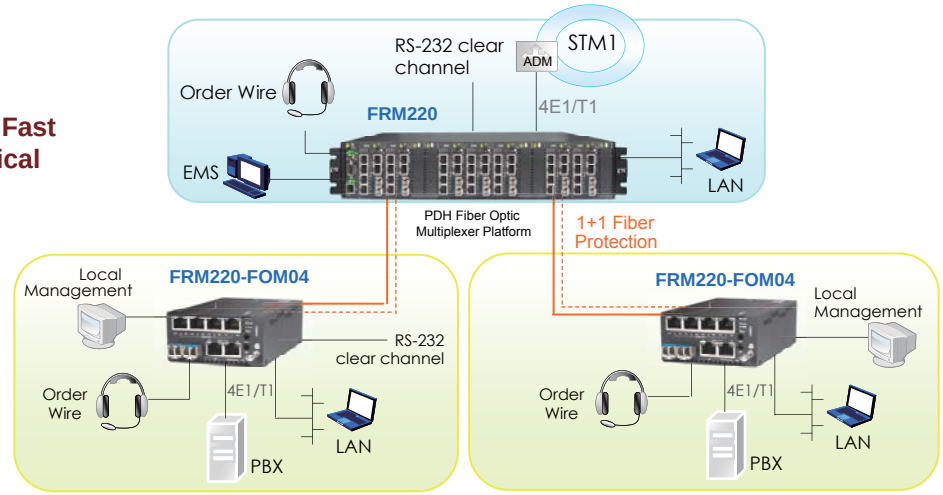
Features

- 4 channels unframed E1/T1
- 10/100Base-TX Ethernet (100M wirespeed)
- Auto MDI/MDIX
- Auto-Negotiation or Force mode
- Supports flow control 802.3x
- Supports 9K jumbo packets
- Supports Link fault pass through for Ethernet
- One clear channel RS232 up to 250Kbps(Async)
- 1+1 fiber protection, less than 50ms
- Supports Digital Diagnostics Monitoring Interface (DDMI) SFP
- AIS on signal loss on E1/T1 and fiber port
- Loopback test on E1/T1, RS232, fiber ports
- Supports Dying Gasp
- Supports local or remote In-band management (Monitor or Configure status) by SNMP manager and console port.
- Supports Order wire Ear / Microphone port.
- Supports On-Line F/W upgrade.

Specifications

E1/T1 ports	
Framing	Unframed (transparent)
Bit Rate	E1:2.048 Mb/s , T1: 1.544Mb/s
Line Code	E1:AMI/HDB3, T1: AMI/B8ZS
Line Impedance	E1: Unbalanced 75 ohms (BNC cable) E1: Balanced 120 ohms (RJ-45) T1: Balanced 100 ohms (RJ-45)
Receiver sensitivity	Short haul
"Pulse" Amplitude	Nominal 2.37V+/-10% for 75 ohms Nominal 3.00V+/-10% for 120 ohms Nom
"Zero" Amplitude	+/-0.3V
Internal Timing	+/-30 ppm
Jitter Performance	According to ITU-T G.823
Performance monitoring	According to ITU-T G.821
Standard	ITU-T G.703, G.704, G.706 and G.732
Interface Connectors	RJ-45, BNC
Test Loops	LLB (Local Loop Back) NELB (Near End Loop Back) RLB (Remote Loop Back) RRLB (Request Remote Loop Back)
Ethernet	
Interface Type	10/100Base-TX
Connector	RJ-45
Standard	IEEE 802.3, 802.3u
Duplex modes	full/half
Indications	FX1 Link, FX2 link, E1/T1 Mode/Link/Loopback test, Order wire phone indicator, LAN Link/Speed.
Power Input	AC adapter, 12VDC
Dimensions	88 x 42 x 139mm(DxWxH)
Temperature	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% RH (non-condensing)
Certifications	CE, FCC, RoHS

Managed 4E1/T1 + Fast Ethernet Fiber Optical Multiplexer



Ordering Information

Model Name	Description
FRM220-FOM04-SR	4 x E1/T1 RJ-45 and 100Mbps Ethernet Fiber Optic Multiplexer(optional SFP module)
FRM220-FOM04-SB	4x E1 BNC and 100Mbps Ethernet Fiber Optic Multiplexer(optional SFP module)

Note: The card is suitable for using in CH02M standalone chassis.

FRM220 – FOM04 – □□

Example: FRM220 – FOM04 – SR